VOL. XXXI. — No. 9. SEPTEMBER 1954.

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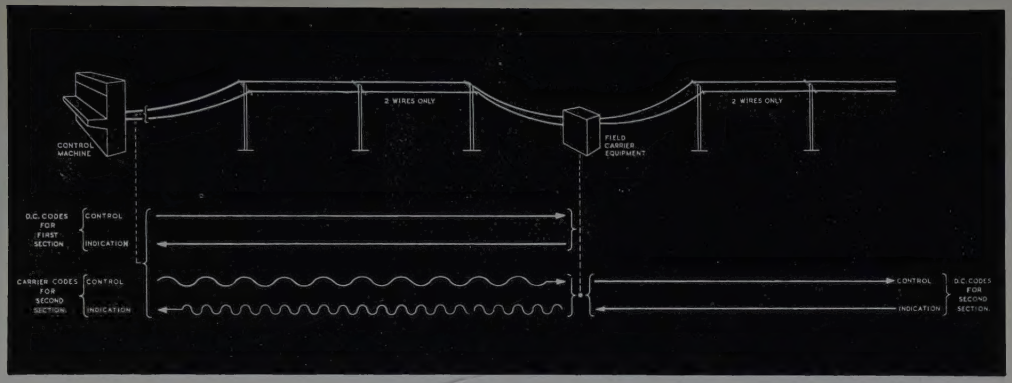
Monthly

Bulletin of the International Railway Congress Association

(English Edition)

C.T.C. WITH CODED CARRIER CONTROL

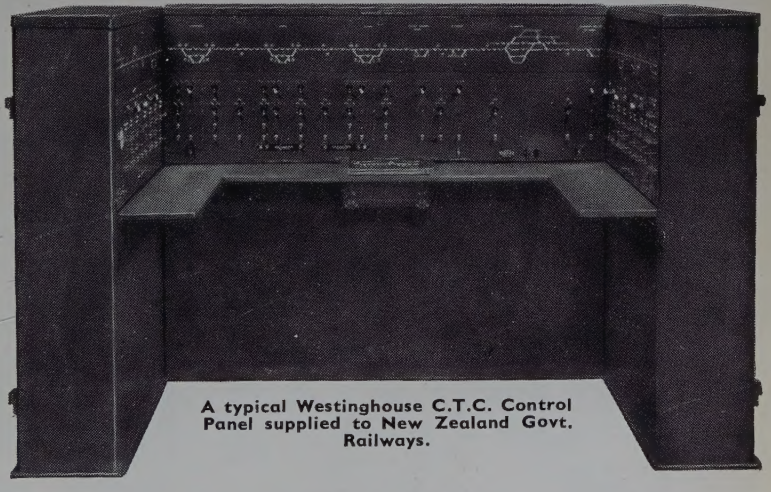


The normal basic capacity of the Westinghouse Time Coded System is 35 "stations", but by employing "Carrier" Control and using a separate frequency for each section, any number of additional basic 35 " station " sections can be controlled over

ONE PAIR OF LINE WIRES

There is no pratical limit to the size of installation or track distance over which control can be provided.

A valuable feature is that although only two line wires are needed, the use of the Coded Carrier Control System allows each basic 35 "station" section to send and receive codes independently of other sections, enabling more than one operator to be employed if required, each controlling his own section, and receiving indications simultaneously.



A typical Westinghouse C.T.C. Control Panel supplied to New Zealand Govt. Railways.

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Centralised Traffic Control

Reduces Operating Costs — Increases Track Capacity — Gives Safe Traffic Working

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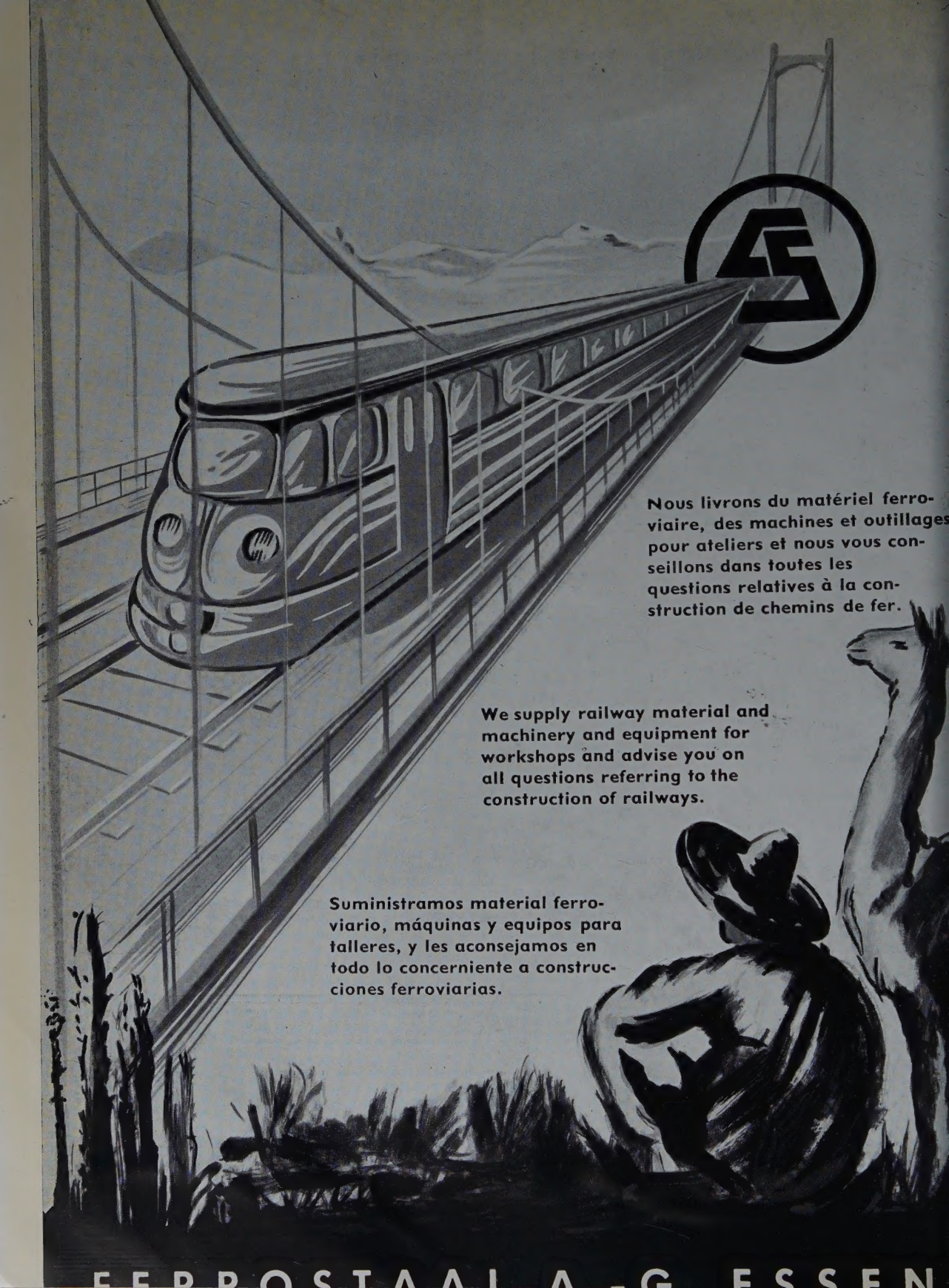
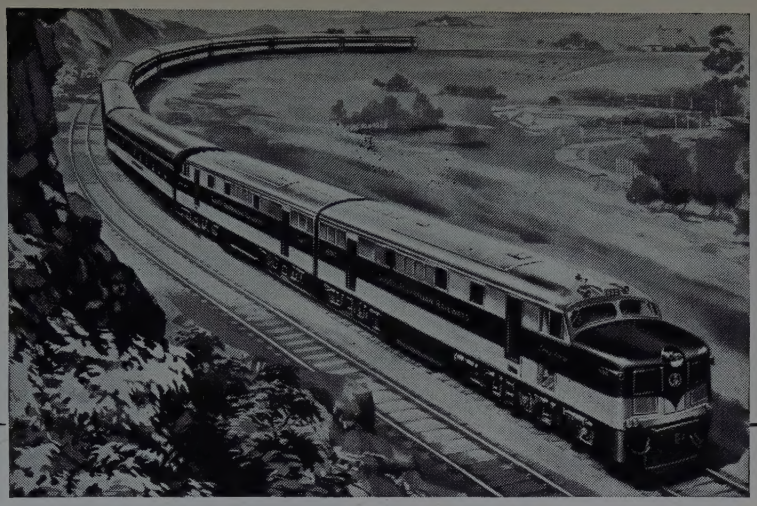

Nous livrons du matériel ferroviaire, des machines et outillages pour ateliers et nous vous conseillons dans toutes les questions relatives à la construction de chemins de fer.
We supply railway material and machinery and equipment for workshops and advise you on all questions referring to the construction of railways.
Suministramos material ferroviario, máquinas y equipos para talleres, y les aconsejamos en todo lo concerniente a construcciones ferroviarias.
FERROSTAAL A.-G. ESSEN

Leaders in Modern Motive Power Development



'ENGLISH ELECTRIC' were pioneers in the development of electric and diesel-electric traction and today large numbers of electric and diesel-electric locomotives and trains, either built or powered by the Company, are in operation on railway systems in many parts of the world.

'ENGLISH ELECTRIC' have carried out comprehensive railway electrification schemes in nine different countries. At present the Company is delivering 3600 H.P. electric locomotives to the Spanish National Railways and has supplied the electric power equipment for nearly 1000 motor coaches operating on the Southern Region of British Railways, whose electrified network of suburban lines is the largest in the world.

The first main-line diesel-electric locomotives to enter service in Great Britain and Australia are powered by 'ENGLISH ELECTRIC' diesel engines and electrical equipment. The Company were also pioneers in the development of diesel-electric shunting locomotives, of which over 300 are in service.

'ENGLISH ELECTRIC'

electric & diesel-electric locomotives

'ENGLISH ELECTRIC'

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'THE ENGLISH ELECTRIC COMPANY LIMITED, QUEENS HOUSE, KINGSWAY, LONDON, W.C.2

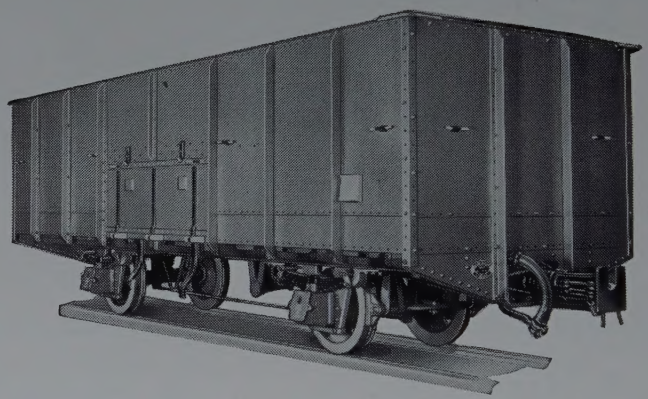
TND. 30E

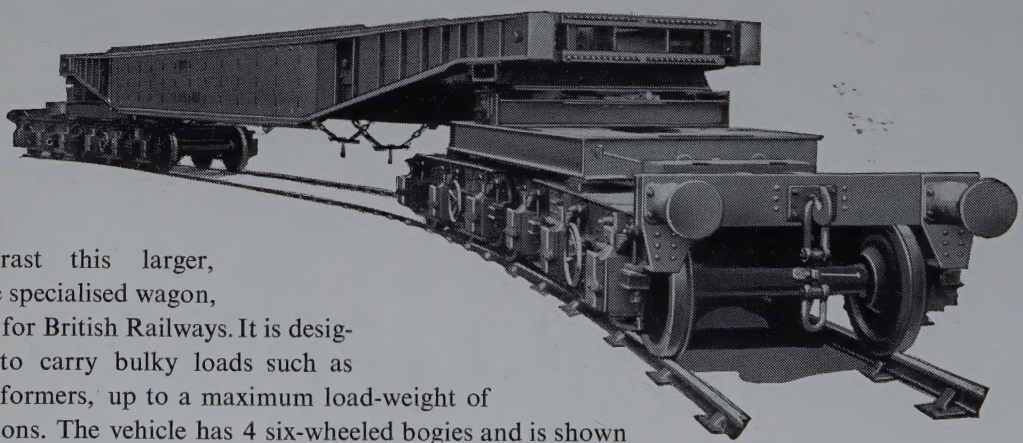
Offices and representatives throughout the world

Standard and Special

Two types of Head Wrightson wagons supplied for Railway use.

This is an example of the smaller type of open goods wagon of metre gauge made by Head, Wrightson & Co. Ltd. for service in India. Wagons of this class are fitted with side doors and both vacuum and hand brakes.





Contrast this larger, more specialised wagon, built for British Railways. It is designed to carry bulky loads such as transformers, up to a maximum load-weight of 135 tons. The vehicle has 4 six-wheeled bogies and is shown standing on a curve of 1 1/2 chains radius.

Please address any enquiries for further information to :

HEAD, WRIGHTSON & Co. LTD.

THORNABY - ON - TEES - STOCKTON - ON - TEES - MIDDLESBROUGH
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GERMANY
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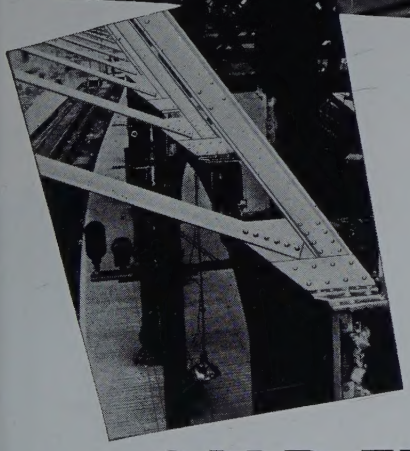
J. M. J. MAUS, LTD., 35 New Broad Street, London, E. C. 2 Telephone : LONdon Wall 6934-5-6

NEW ROOF
for London Bridge Station
in *Aluminium*



Aluminium was chosen for this important roof reconstruction contract because of its unique advantages, which include:

- **rapid erection**
- **light to lift and handle**
- **low loading on existing supports**

This advertisement appears by courtesy of British Railways and the Main Contractors Carter-Horseley (Engineers) Limited.

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E. V. R.

22, rue de l'Arcade, PARIS (8e)

THE LIGHTING

OF THE NEW DIESEL ELECTRIC RAILCARS FOR LONG RUNS OF THE FRENCH NATIONAL RAILWAYS

After careful investigation into the problems of lighting for the new high speed long run railcars recently put into service, the French National Railways have adopted the E. V. R. designs and equipment shortly described in what follows.

THE GENERATORS are driven by the Diesel traction engines; they supply, together with the charging of the battery, the energy for the lighting apparatus and various auxiliaries : fans, etc...

THE 72 V DIRECT CURRENT permits direct feeding of the fluorescent tubes without interposition of any converter group; hence an equipment economical in purchase and in maintenance.

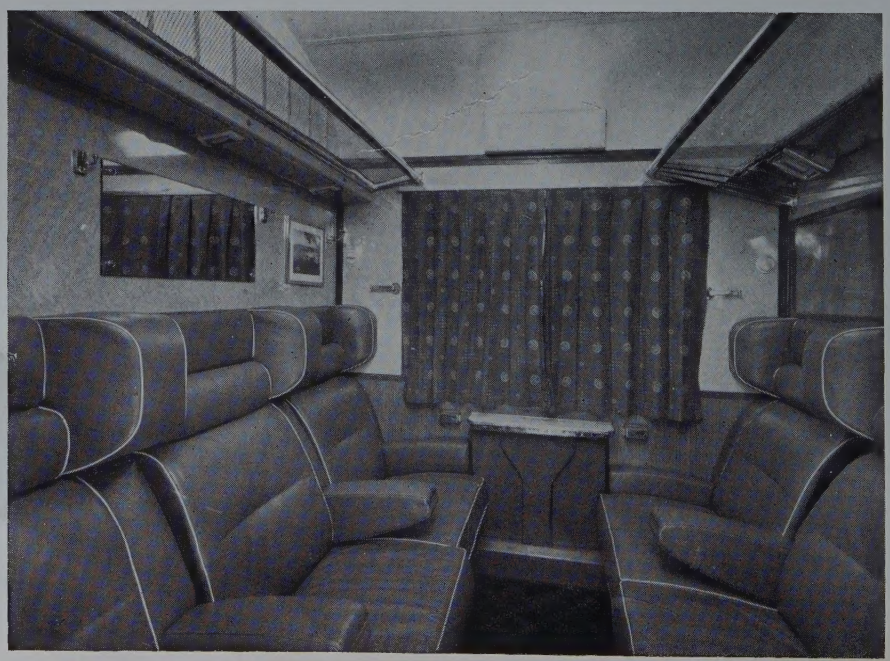
THE GENERAL LIGHTING is obtained by two 1' 5" fluorescent tubes, the one above the window and the other above the door. Each tube is fitted in a special ceiling fixture which :

— allows directing the lighting flux on the reading plane;
— provides protection on the tubes thanks to its being dust-proof;
— allows an easy cleaning of the glasswares.

THE INDIVIDUAL LIGHTING for each passenger is obtained, when general lighting is out, by a lamp fitted into the luggage rack in a special directing flux fixture. A passenger can thus read without his sleeping neighbours being disturbed.

Thanks to these special lighting apparatus under LUMINATOR Licence, and notwithstanding the low lighting power used, each passenger wherever he might be sitting gets on his reading plane 100 lux under general lighting and 200 lux if the individual lamp is also burning.

First class compartment.
(the tube above the window is on, individual lamps are out)



A four
axle diesel-mechanic
large capacity rail car,
4 feet 8 1/2 inch. gauge,
weight in running order
(2 x 145 h. p.)
31000 kg.

WAGGONFABRIK TALBOT AACHEN - GERMANY

Upper Class Coach,
3 feet 3 3/8 inch. gauge,
for the Burma State
Railways.

TALBOT

the
oldest German
Wagon-Factory
was founded
1838

Eight axle large
capacity rail car,
4 feet 8 1/2 inch. gauge,
total length 123 feet 4 3/8 inch.
with a capacity of 4 x 63 KW
for the
Siebengebirgsbahn.

WAGGONFABRIK TALBOT AACHEN - GERMANY

Coaches with
4 feet 8 1/2 inch. gauge,
total length 86 feet 1 1/2 inch.
for the German Federal
Railways.

SEEN BY THE

Left: The 4,000 kW Bond Street substation (London Transport Railways) equipped exclusively with Hewittic Rectifiers. The plant comprises four 1,000 kW combined rectifier and transformer units, the transformers being totally enclosed air-cooled. This company is also responsible for the supply and installation of all A.C. and D.C. control gear at this substation. Some 90,000 kW of Hewittic Rectifiers have been supplied to the London Transport Executive.

Hewittic

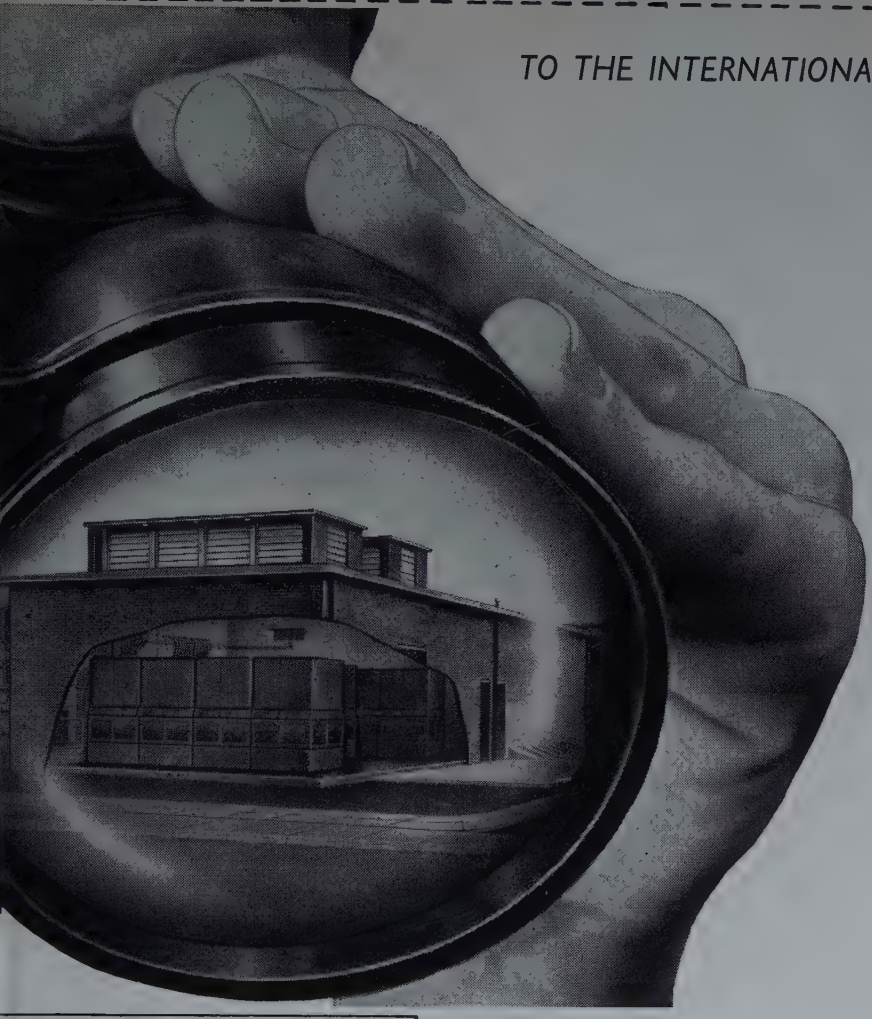
HACKBRIDGE AND HEWIT

TELEPHONE: WALTON-ON-THAMES 760 (8 lines) **WALTON-ON-THA**

OVERSEAS REPRESENTATIVES — ARGENTINA : H. A. Roberts & Cia., S.R.L., Buenos Aires — AUSTRALIA : Hackbridge and Hew Electric Co., Ltd., Sydney — BELGIUM & LUXEMBOURG : M. Dorfman, 124, Avenue des Cerisiers, Woluwé I, Brussels — BRAZIL ; O G. Mors, Caixa Postal 1280, Sao Paulo — CANADA : The Northern Electric Co Ltd., Montreal, etc. — CHILE : Ingenieria Electrica S.A.C., Santi — EAST AFRICA : Gerald Hoe & Co., Private Bag, Nairobi — EGYPT : Giacomo Cohenca Fils, S.A.E., Cairo — FINLAND : Sähkö ja Kone O.Y. Hermes, P. Esplanaadikatu 37, Helsinki — HOLLAND : J. Kater E.I., Ouderkerk a.d. Amstel, Amsteldijk Noord 103c — INDIA : Stea Mining Equipement (India), Ltd., Calcutta ; Easun Engineering Co. Ltd., Madras, I — IRAQ : J. P. Bahoshy Bros., Baghdad — MALA

DELEGATES...

TO THE INTERNATIONAL RAILWAY CONGRESS
LONDON 1954



ctifiers

Right : One of 28 substations (total capacity 117,500 kW) being equipped with Hewittic Rectifiers by the British Transport Commission for the Southern Region of British Railways. The photograph shows Wimbledon substation with one wall cut away to show the two 2,500 kW rectifiers in this half of the building.

ELECTRIC CO., LIMITED

IRREY, ENGLAND

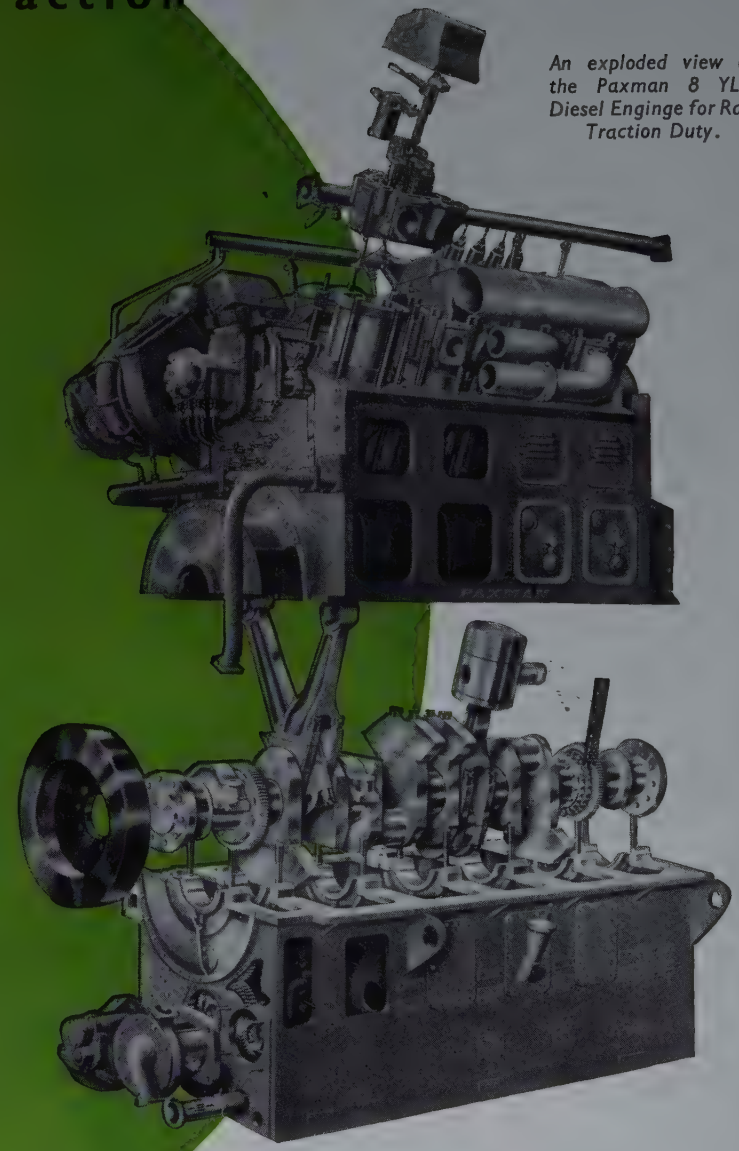
TELEGRAMS: ELECTRIC, WALTON-ON-THAMES

DRE & BORNEO : Harper, Gilfillan and Co. Ltd., Kuala Lumpur — NEW ZEALAND : Richardson McCabe & Co. Ltd., Wellington, etc. STAN : James Finlay & Co. Ltd., Karachi — SOUTH AFRICA : Fraser & Chalmers (S.A.) (Pty.), Ltd., Johannesburg — SOUTHERN A : Fraser & Chalmers (S.A.) (Pty.), Ltd., Salisbury, etc. — TRINIDAD & TOBAGO : Thomas Peake & Co., Port of Spain — TURKEY : alim Oker, 43, Posta Caddesi, Ankara — URUGUAY : H. A. Roberts & Cia., S.A.U., Montevideo — U. S. A. : Electro Machinery cion, 50, Broad St., New York, 4.

PAXMAN diesel engines

for rail traction

Paxman YL diesels are especially suitable for main line and mixed traffic locomotives. They are available with 8, 12 and 16 cylinders in vee form, and have an output range of 533 to 2,000 h.p. in a speed range of 750 to 1,000 r.p.m. Robust and reliable, they are suitable for electrical, hydraulic or mechanical power transmission.



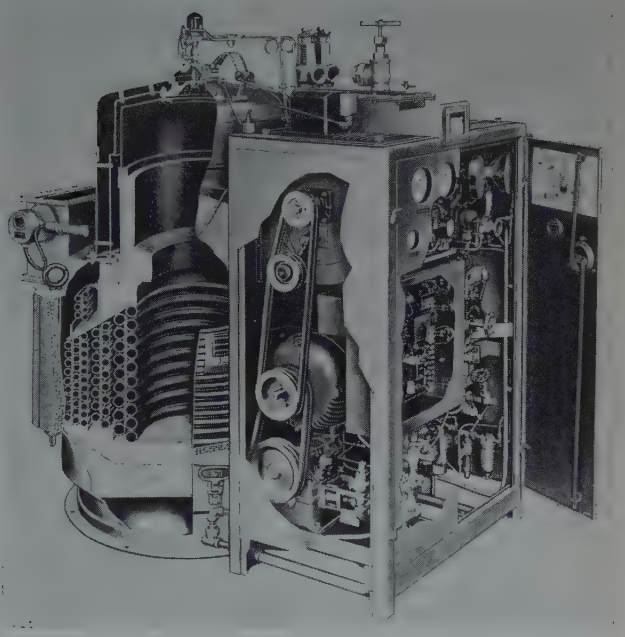
An exploded view of the Paxman 8 YLX Diesel Enginge for Rail Traction Duty.

DAVEY, PAXMAN & COMPANY LIMITED COLCHESTER

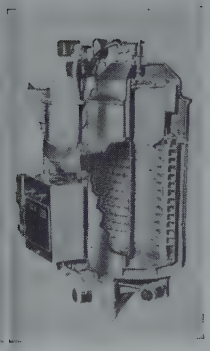
(ASSOCIATED WITH RUSTON AND HORNSBY LIMITED LINCOLN)

VAPOR PRODUCTS

serving railroads over hundreds of millions of miles



Your attention is directed to the record of VAPOR products — in railroad service for over fifty years. Now used in 25 countries in Western Europe and over the world, VAPOR equipment includes all components of the steam or hot water heating system — from heat source, through regulators, radiation, valves, and thermostatic controls. Also, where electric heat is necessary, VAPOR Control Systems have found wide use with most satisfactory results.



The VAPOR model OK steam generator is sectionally illustrated here to show you its sturdy construction. The unit is robust, reliable, and compact — with exceptionally high output per unit of weight, on axles. Vital statistics of OK-4616 : sustained output — 750 kg/h; operating weight — 1350 kg; overall dimensions — 165 × 110 × 160 cm. Similar models available with outputs ranging from 225 to 2000 kg/h.

Also illustrated in section — the compact VAPOR 4915 Circulating Water Heater (approx. 115 kg and 70 × 40 × 48 cm, with 38,000 kg Cal/h output. Widely utilized in heating systems on diesel railcars, and on diesel locomotives to automatically maintain full operating temperature of the engine coolant liquid. This of course assures full operating efficiency of the diesel, and eliminates the need for wasteful idling while on siding waiting for load.

The VAPOR Thermostat shown here is just one in the hundreds of model and voltage designations now controlling railroad heating systems and air conditioning. VAPOR temperature controls are characterized by accurate performance and simple maintenance. They flatten the curve of temperature variation to within one degree centigrade, and all are manufactured to rigorous standards on exclusively patented production equipment.

You are cordially invited to send for complete information. Please write to

VAPOR INTERNATIONAL CORPORATION, LTD.

224, SOUTH MICHIGAN AVENUE CHICAGO 4, ILLINOIS, U.S.A.

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LIMITED LIABILITY COMPANY

Steel-works, Forges and Engineering Works
Head-Office and General Direction at
St-Michel near Bruges

ALL ROLLING STOCK
AND FIXED EQUIPMENT FOR
RAILWAYS AND TRAMWAYS

BRIDGES, FRAMEWORKS, TANKS, GAS-HOLDERS AND ALL STEEL CONSTRUCTIONS RIVETED AND WELDED

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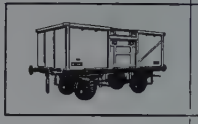
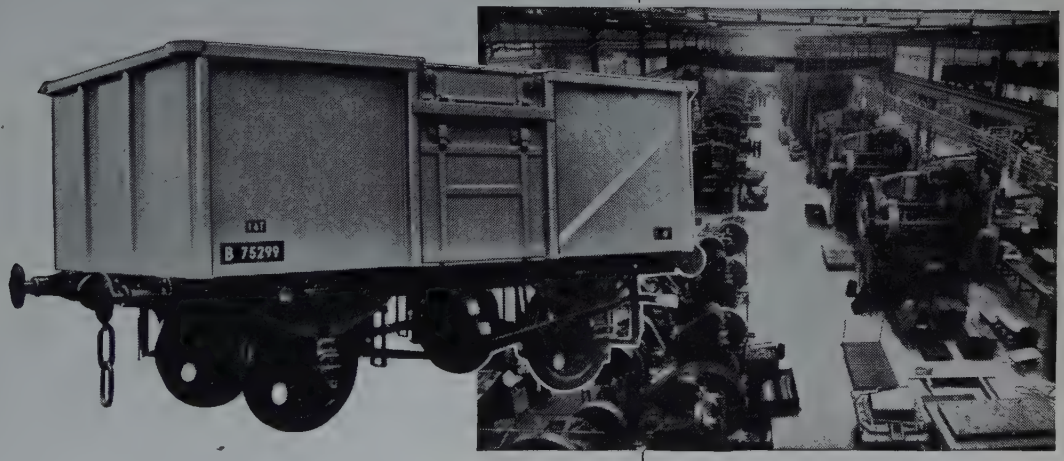
WHEEL SETS — STEEL CASTINGS — IRON FOUNDRY
SPRINGS

11,000 . . . STRONG

Steel means strength. Strength means service. Mile after mile, load after load, year after year. Over 11,000 of these sturdy 16-ton all-steel mineral wagons are being craftsman-built by the Railway Division of Pressed Steel Company to the order of British Railways annually.





In the specialised, 30-acre plant at Linwood near Glasgow, P.S.C. manufactures rolling stock . . . many thousands strong . . . for both home and export markets.

PRESSED STEEL COMPANY LIMITED

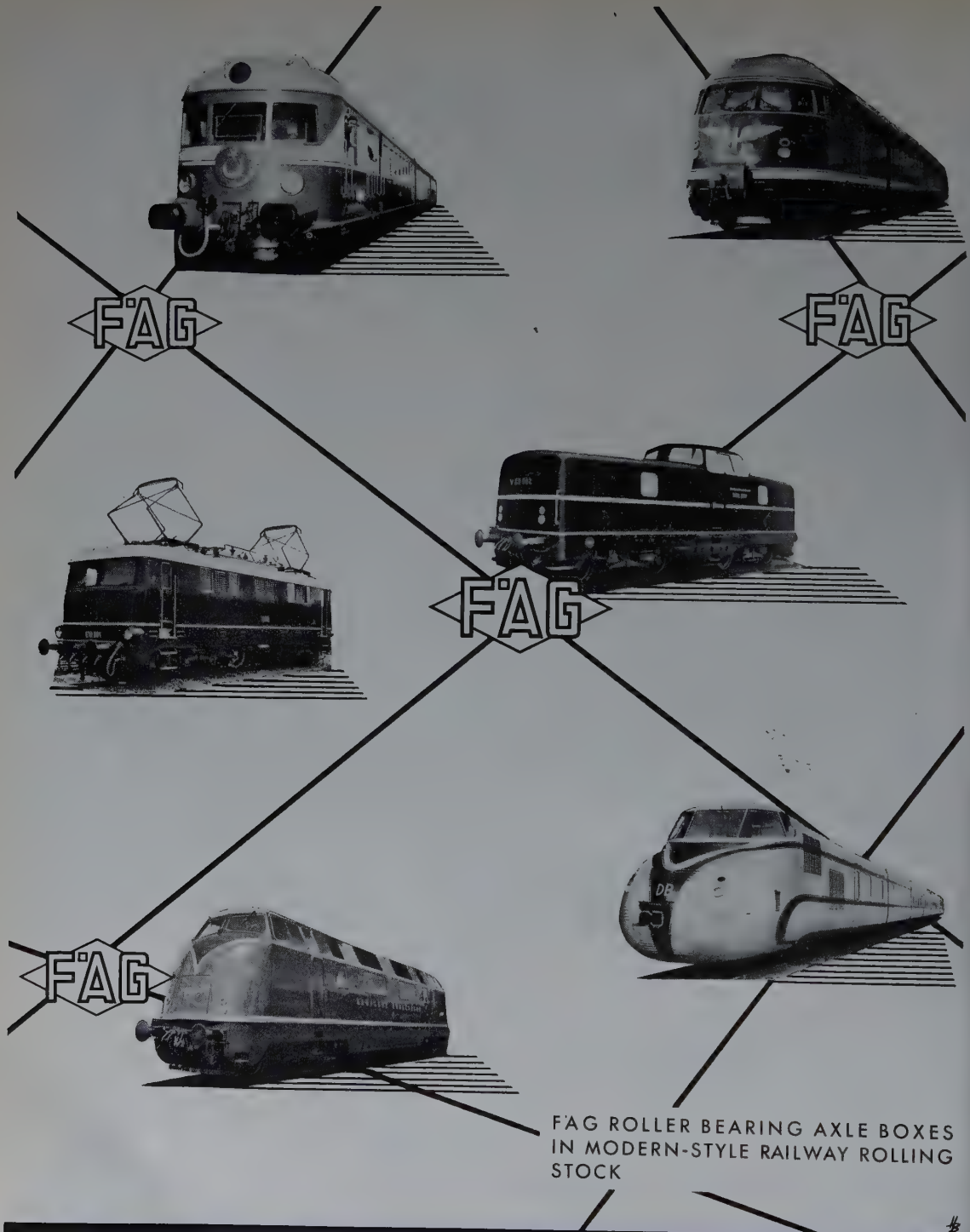
Railway Division

LINWOOD, PAISLEY, SCOTLAND

HEAD OFFICE, COWLEY, OXFORD

London Office, Sceptre House, 169 Regent Street. W.1.

Manufacturers also of Motor Car Bodies, Prestcold Refrigeration Equipment, Agricultural Implements and Pressings of all types.



FAG ROLLER BEARING AXLE BOXES IN MODERN-STYLE RAILWAY ROLLING STOCK

KUGELFISCHER GEORG SCHÄFER & CO. SCHWEINFURT (GERMANY)

MV-GRS

POWER SIGNALLING

POWER FRAMES

Panel at Hooghly Ghat, India

Bristol West Cabin—British Railways, Western Region, 328 levers

SIGNAL CONTROL PANELS

TYPE NX ROUTE RELAY INTERLOCKING

Bow Junction—British Railways, Eastern Region

CENTRALIZED TRAFFIC CONTROL

New Zealand Government Railways

The experience of MV-GRS engineers covers all aspects of railway signalling throughout the world. The Company's technical resources and practical knowledge have enabled MV-GRS to pioneer many important advances in power signalling. The first plug-in detachable relays, for example, were introduced into service more than ten years ago by MV-GRS. Similarly, MV-GRS led the way in the development of signalling systems for outstanding marshalling yards such as Toton, L.M. Region. For future advances in railway signalling, from complete Centralised Control systems to point operating machines—look to MV-GRS. Please write for Publication SP.7601-1.

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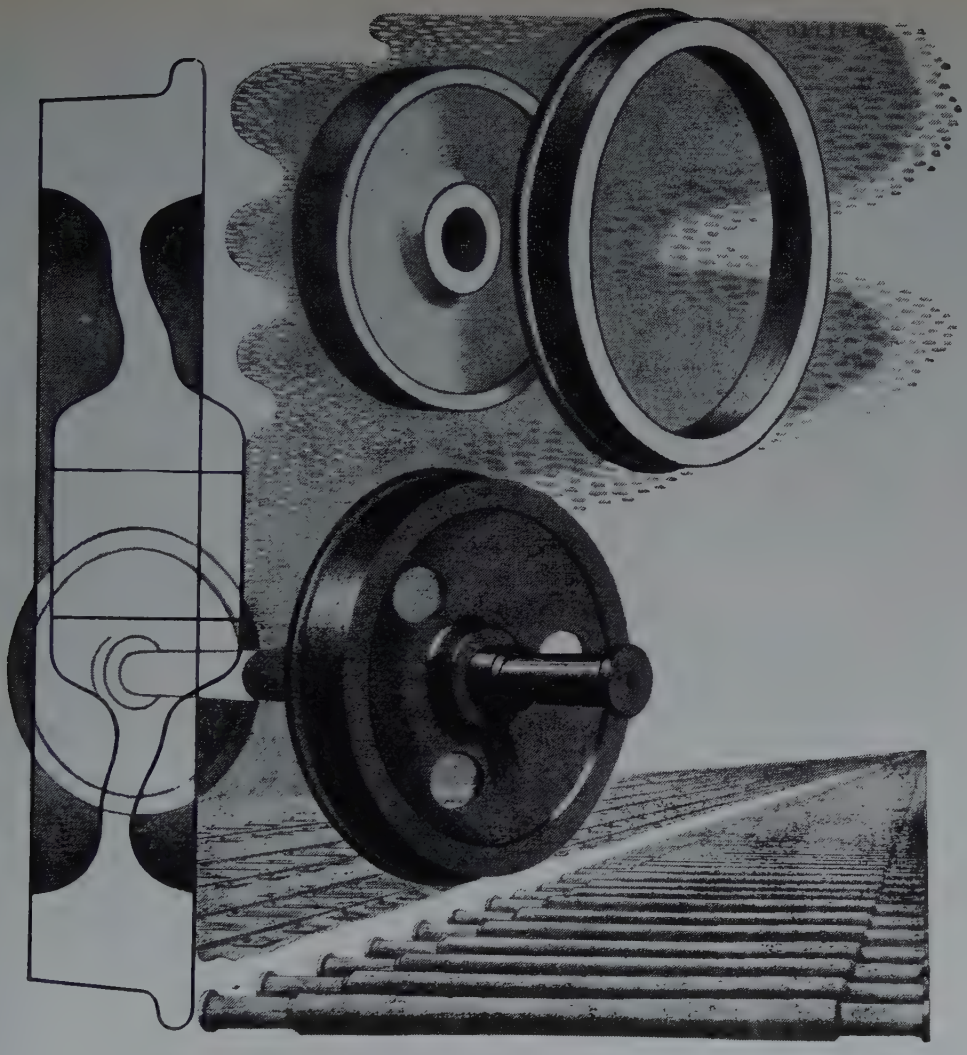
MV-GRS *Signalling Equipment for Railways*

STEAM- AND DIESEL-HYDRAULIC LOCOMOTIVES

KRAUSS-MAFFEI
MÜNCHEN
GERMANY



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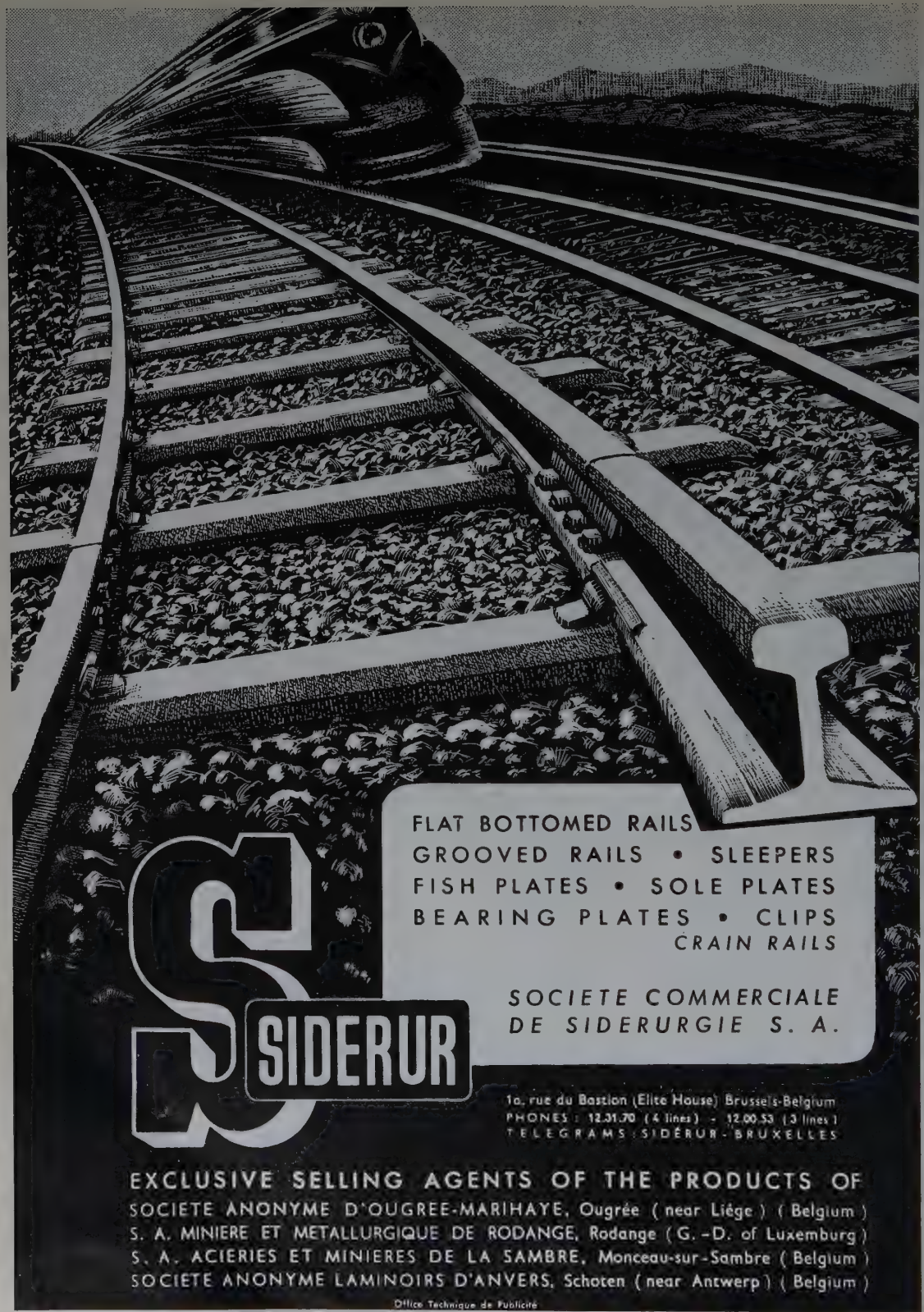
The Steel Peech & Tozer works is famous for its steel tyres, produced for every kind of rolling stock up to the largest locomotive tyres. Notable are the unusually tough and hard-wearing 'CP' and 'BC' brands, and other specially-treated tyres, much esteemed by railway engineers in many lands. At this works are also produced rolled steel solid wheels, disc centres, locomotive carriage and wagon straight axles, locomotive crank axles and laminated springs.

At the Workington plant high duty wear-resisting Bessemer acid steel rails are made, together with fishplates, bearing plates and steel sleepers.

TEEL PEECH & TOZER · THE ICKLES · SHEFFIELD
VORKINGTON IRON & STEEL COMPANY · WORKINGTON
Branches of The United Steel Companies Limited of Sheffield, England

SP.133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S. A. MINIERE ET METALLURGIQUE DE RODANGE, Rodange (G.-D. of Luxemburg)
S. A. ACIERIES ET MINIERES DE LA SAMBRE, Monceau-sur-Sambre (Belgium)
SOCIETE ANONYME LAMINOIRS D'ANVERS, Schoten (near Antwerp) (Belgium)
Office Technique de Publicité

MONTHLY BULLETIN

OF THE

INTERNATIONAL RAILWAY CONGRESS ASSOCIATION

(ENGLISH EDITION)

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Orders for copies previous to January 1931 should be addressed to Messrs. Weissenbruch & Co. Ltd., Printers, 49, rue du Poinçon, Brussels.

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OF THE

Permanent Commission of the International Railway Congress Association

READING ROOM : **19, rue du Beau-Site, Brussels.**

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The Permanent Commission of the Association is not responsible for the opinions expressed in the articles published in the Bulletin.

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An edition in French is also published.

Bulletin of the International Railway Congress Association

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Bull. of the Int. Ry. Congress Ass., No. 9, September.

Summary of the proceedings of the sixteenth Session (London, 1954) of the International Railway Congress Association. (196 pages, 3 photos and tables.)

Vol. XXXI. — No. 9. September 1954.

BULLETIN
OF THE
INTERNATIONAL RAILWAY CONGRESS
ASSOCIATION
(ENGLISH EDITION)

[385 (06 .112]

SIXTEENTH SESSION

LONDON, 19th to 26th MAY, 1954

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SUMMARY

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Number of the question	TITLE OF THE QUESTION	DOCUMENTS	Year, month and page of the English *Bulletin*	Number of the separate issue
		1st Section. — Way and Works.		
1	What are the present tendencies relating to the organization of the maintenance of the permanent way : methods of determination of the works to be done and in particular, possibilities of the use of detecting-recording coaches, planning of the works, effects of mechanization; importance of the sidetracks for the movement of the gangs and the mechanical devices. Economic and financial aspect.	Report (America (North and South), Australia (Commonwealth of), Burma, Ceylon, Denmark, Egypt, Finland, India, Indonesia, Irak, Iran, Republic of Ireland, New Zealand, Norway, Pakistan, South Africa, Sweden and the United Kingdom of Great Britain and Northern Ireland and the territories for whose international relations the United Kingdom is responsible), by O. Hjelte Claussen.	August 1953, p. 471.	1
		Report (Belgium and Colony, France and French Union, Greece, Italy, Luxemburg, Netherlands, Portugal and Colonies, Spain, Switzerland, Syria and Turkey), by C. Feyrabend.	December 1953, p. 993.	15
		Report (Austria, Bulgaria, Czechoslovakia, Germany, Hungary, Poland, Rumania, and Yugoslavia), by Dr.-Ing. habil. Gerhard Schramm.	March 1954, p. 269	21
2	*a*) Modernisation of station buildings and methods employed in financing modernisation projects. *b*) Standardisation of unit construction applied to railway building.	Report (America (North and South), Australia (Commonwealth of), Burma, Ceylon, Denmark, Egypt, Finland, India, Indonesia, Irak, Iran, Republic of Ireland, New Zealand, Norway, Pakistan, South Africa, Sweden and the United Kingdom of Great Britain and Northern Ireland and the territories for whose international relations the United Kingdom is responsible), by Dr. F.F.C. Curtis.	November 1953, p. 831.	9
		Report (Austria, Belgium and Colony, Bulgaria, Czechoslovakia, France and French Union, Germany, Greece, Hungary, Italy, Luxemburg, Netherlands, Poland, Portugal and Colonies, Rumania, Spain, Switzerland, Syria, Turkey and Yugoslavia), by José Chedas Bogarim.	December 1953, p. 935.	13

Number of the question	TITLE OF THE QUESTION	DOCUMENTS	Year month and page of the English *Bulletin*	Number of the separate issue
	2nd Section. — Locomotives and Rolling Stock.			
3	Technical and economic investigation of the basic characteristics of electric traction systems now in use, with a view to decide whether, and to what extent, there are relevant reasons for preferring one system to another.	Report (America (North and South), Australia (Commonwealth of), Burma, Ceylon, Denmark, Egypt, Finland, India, Indonesia, Irak, Iran, Republic of Ireland, New Zealand, Norway, Pakistan, South Africa, Sweden and the United Kingdom of Great Britain and Northern Ireland and the territories for whose international relations the United Kingdom is responsible), by S.B. Warder.	October 1953, p. 657.	6
	In particular are there any reasons in regard to : *a*) power supply; *b*) overhead line and fixed track installations; *c*) motive power units; *d*) working and maintenance costs.	Report (Austria, Belgium and Colony, Bulgaria, Czechoslovakia, France and French Union, Germany, Greece, Hungary, Italy, Luxemburg, Netherlands, Poland, Portugal and Colonies, Rumania, Spain, Switzerland, Syria, Turkey and Yugoslavia), by Prof. Dr. Ing. C. Guzzanti.	March 1954, p. 297.	22
4	Means and methods to improve the efficiency of steam locomotives : *a*) increase of the steam pressure; *b*) types of grates; *c*) superheating of the steam; *d*) preheating of the feeding water; *e*) feed water treatment, etc.	Report (America (North and South), Australia (Commonwealth of), Burma, Ceylon, Denmark, Egypt, Finland, India, Indonesia, Irak, Iran, Republic of Ireland, New Zealand, Norway, Pakistan, South Africa, Sweden and the United Kingdom of Great Britain and Northern Ireland and the territories for whose international relations the United Kingdom is responsible), by C.T. Long.	January 1954, p. 117.	18
		Supplement to Report, by C.T. Long.	August 1954, p. 757.	—
		Report (Austria, Belgium and Colony, Bulgaria, Czechoslovakia, France and French Union, Germany, Greece, Hungary, Italy, Luxemburg, Netherlands, Poland, Portugal and Colonies, Rumania, Spain, Switzerland, Syria, Turkey and Yugoslavia), by Dr. Ing. Diegoli.	April 1954, p. 435.	24
	3rd Section. — Working.			
5	Radiophonic communications in railway working.	Report (America (North and South), Australia (Commonwealth of), Burma, Ceylon, Denmark, Egypt, Finland, India, Indonesia, Irak, Iran, Republic of Ireland, New Zealand, Norway, South Africa, Sweden and the United Kingdom of Great Britain and Northern Ireland and the territories for whose international relations the United Kingdom is responsible), by S. G. Hearn and J. H. Fraser.	September 1953, p. 615 and October 1953, p. 709.	5
		Report (Austria, Belgium and Colony, Bulgaria, Czechoslovakia, France and French Union, Germany, Greece, Hungary, Italy, Luxemburg, Netherlands, Poland, Portugal and Colonies, Rumania, Spain, Switzerland, Syria, Turkey and Yugoslavia), by Dipl. Ing. J. Frischauf.	April 1954, p. 405.	23

Number of the question	TITLE OF THE QUESTION	DOCUMENTS	Year, month and page of the English *Bulletin*	Number of the separate issue
6	*a*) Remote operating of signal boxes : technical realizations, working orders. *b*) Electric working and control devices for hinged and « flexible » points and switches. Control of accidental trailing of the switch blade.	Report (America (North and South), Australia (Commonwealth of) Burma, Ceylon, Denmark, Egypt, Finland, India, Indonesia, Irak, Iran, Republic of Ireland, New Zealand, Norway, Pakistan, South Africa, Sweden and the United Kingdom of Great Britain and Northern Ireland and the territories for whose international relations the United Kingdom is responsible), by R. Sørvik.	August 1953, p. 495	2
		Report (Belgium and Colony, Spain, France and French Union, Greece, Italy, Luxemburg, Netherlands, Portugal and Colonies, Switzerland, Syria and Turkey), by J. Nogués.	October 1953, p. 801.	8
		Report (Austria, Bulgaria, Czechoslovakia, Germany, Hungary, Poland, Rumania and Yugoslavia), by Prof. A. Dobmaier.	November 1953, p. 923.	12
		4th Section. — General.		
7	Modernisation of the methods to be adopted for recruiting the staff in number and qualifications. Harmonious renewal of the various ranks, indispensable reserve lists, ratio of the permanent and temporary staff. Part played by the medical service in the recruting.	Report (America (North and South), Australia (Commonwealth of), Burma, Ceylon, Denmark, Egypt, Finland, India, Indonesia Irak, Iran, Republic of Ireland, New Zealand, Norway, Pakistan, South Africa, Sweden and the United Kingdom of Great Britain and Northern Ireland and the territories for whose international relations the United Kingdom is responsible), by F. Lemass.	November 1953, p. 837.	10
		Supplement to Report, by F. Lemass.	December 1953, p. 985.	—
		Report (Austria, Belgium and Colony. Bulgaria, Czechoslovakia, France and French Union, Germany, Greece, Hungary, Italy, Luxemburg, Netherlands, Poland, Portugal and Colonies, Rumania, Spain, Switzerland, Syria. Turkey and Yugoslavia), by Dr. A. Huyberechts and R. Berghmans.	January 1954, p. 47.	17
8	Determination of the principles of geographical and functional organization of a railway system. Simplification and retrenchment of the administration of railways.	Report (America (North and South), Australia (Commonwealth of), Burma, Ceylon, Denmark, Egypt, Finland, India, Indonesia, Irak, Iran, Republic of Ireland, New Zealand, Norway, Pakistan, South Africa, Sweden and the United Kingdom of Great Britain and Northern Ireland and the territories for whose international relations the United Kingdom is responsible), by Bengt Adamson.	September 1953, p. 573.	4
		Supplement to Report by Bengt Adamson.	October 1953, p. 729.	—
		Report (Austria, Belgium and Colony, Bulgaria, Czechoslovakia, France and French Union, Germany, Greece, Hungary, Italy, Luxemburg, Netherlands, Poland. Portugal and Colonies, Rumania, Spain, Switzerland, Syria, Turkey and Yugoslavia), by R. Dugas.	December 1953, p.949.	14

Number of the question	TITLE OF THE QUESTION	DOCUMENTS	Year, month and page of the English *Bulletin*	Number of the separate issue
9	Railway participation in road transport undertakings.	Report (America (North and South), Australia (Commonwealth of), Burma, Ceylon, Denmark, Egypt, Finland, India, Indonesia, Irak, Iran, Republic of Ireland, Netherlands, New Zealand, Norway, Pakistan, South Africa, Sweden and the United Kingdom of Great Britain and Northern Ireland and the territories for whose international relations the United Kingdom is responsible), by Dr. J.P.B. Tissot van Patot.	January 1954, p 1.	16
		Report (Austria, Belgium and Colony, Bulgaria, Czechoslovakia, France and French Union Western Germany, Greece, Hungary, Italy, Luxemburg, Poland, Portugal and Colonies, Rumania, Spain Switzerland, Syria, Turkey and Yugoslavia), by Dr. G. Dreyer.	February 1954, p. 239.	20
	5th. Section. — Light railways and Colonial railways.			
10	Wear of rails on curves : *a*) running effects of locomotives and motor coaches with motor bogies; *b*) characteristics of track-laying on curve and details of the rolling stock liable to cause premature wear of the rails; *c*) results of the investigations made and proposed remedies. Use of rail-lubrification processes.	Report (America (North and South), Australia (Commonwealth of), Burma, Ceylon, Denmark, Egypt, Finland, India, Indonesia, Irak, Iran, Republic of Ireland, New Zealand, Norway, Pakistan, South Africa, Sweden and the United Kingdom of Great Britain and Northern Ireland and the territories for whose international relations the United Kingdom is responsible), by V. Venkataramayya.	September 1953, p. 533.	3
		Report (Austria, Belgium and Colony, Bulgaria, Czechoslovakia, France and French Union, Germany, Greece, Hungary, Italy, Luxemburg, Netherlands, Poland, Portugal and Colonies, Rumania, Spain, Switzerland, Syria, Turkey and Yugoslavia), by L. Ripert.	October 1953, p. 737.	7
11	Protection of overhead lines, substations locomotives and motor-coaches against accidents of electric nature (excess voltage, overloads, short-circuits, lightning).	Report (America (North and South), Australia (Commonwealth of), Burma, Ceylon, Denmark, Egypt, Finland, India, Indonesia, Irak, Iran, Republic of Ireland, New Zealand, Norway, Pakistan, South Africa, Sweden and the United Kingdom of Great Britain and Northern Ireland and the territories for whose international relations the United Kingdom is responsible), by T.S. Pick.	November 1953, p. 887.	11
		Report (Austria, Belgium and Colony, Bulgaria, Czechoslovakia, France and French Union, Germany, Greece, Hungary, Italy, Luxemburg, Netherlands, Poland, Portugal and Colonies, Rumania, Spain, Switzerland, Syria, Turkey and Yugoslavia), by J.F.M De Boeck.	February 1954, p. 191.	19

PROGRAMME OF EVENTS

Monday, May 17th.

Morning, from 10 a.m. to 12 noon. — Registration of Delegates.

Afternoon, from 3.0 p.m. to 5.0 p.m. — Registration of Delegates.

Tuesday, May 18th.

Morning, from 10 a.m. to 12 noon. — Registration of Delegates.

Afternoon, from 3.0 p.m. to 5.0 p.m. — Registration of Delegates.

Wednesday, May 19th.

Morning, 8.30 a.m. — Registration of Delegates.

9.0 a.m. — Meeting of the Permanent Commission.

10.30 a.m. — Opening Ceremony graced by the presence of His Royal Highness the DUKE OF GLOUCESTER.

Afternoon. — Technical visits and excursions (*).

Evening. — Reception by Her Majesty's Government in honour of the Delegates.

Thursday, May 20th.

Morning, 9.0 a.m. — Sectional Meetings.

Afternoon. — Technical visits and excursions (*).

Friday, May 21st.

Morning, 9 a.m. — Sectional Meetings.

Afternoon. — Technical visits and excursions (*).

Saturday 22nd and Sunday 23rd May.

Week-end Excursions offered by British Railways : Scotland, West Country or Southern Countries.

Monday, May 24th.

Morning, 9 a.m. — Sectional Meetings.

Afternoon. — Technical visits and excursions (*).

Tuesday, May 25th.

Morning, 9 a.m. — Sectional Meetings.

11 a.m. — Plenary Meeting.

Afternoon. — Exhibition and excursions (*).

Evening. — Official Congress Dinner.

Wednesday, May 26th.

Morning, 9 a.m. — Sectional Meetings. Exhibition.

Afternoon, 3.0 p.m. — Plenary Meeting.

4.0 p.m. — Closing Ceremony under the presidency of General SIR BRIAN ROBERTSON.

5.0 p.m. — Meeting of the Permanent Commission.

Evening, 7.30 p.m. — Covent Gardens Opera House : Performance of Ballet.

Thursday, May 27th.

Morning. — Industrial visits.

Evening. — Departure of Post-Congress Tours.

(*) Programme of *Technical Visits* arranged for the afternoons of the 19th, 20th, 21st, 24th, 25th and 26th May :

1. Willesden Carriage Cleaning and Servicing Depot, London Midland Region, British Railways.
2. Electrical Control Rooms and Sub-Stations, Southern Region, British Railways.
3. Swindon Works, Western Region, British Railways. Excursion by motor coach from Swindon.
4. London Transport Civil Engineering Depot, Lillie Bridge, London.
5. Southampton Docks.
6. Liverpool Street-Shenfield Electrification Eastern Region, British Railways, and Central, Line Tube Extension, London Transport.
7. British Railways Locomotive Testing Station, Rugby, London Midland Region. Excursion by motor coach from Rugby.
8. Railway protection works against sea erosion, Folkestone Warren, Southern Region, British Railways. Excursion by motor coach from Folkestone.
9. London Transport Railway Rolling Stock Overhaul Works, Acton (London).
10. British Railways/London Transport Exhibition of the latest locomotives, rolling stock, civil engineering and signalling equipment, Willesden Motive Power Depot, London.
11. British Railways Exhibition « Collection and Delivery — Past and Present », Marylebone station, London.

* * *

Note. — For particulars of these visits, please see pages 1001 of this *Bulletin*.

Afternoon excursions on May 19, 20, 21, and 24 :

1. Excursion to Hampton Court Palace.
2. Sightseeing tours of London.
3. Excursion to Brighton.
4. Excursion to Windsor, via Stoke Poges.
5. Visit to Cambridge University.

List of the participating Administrations and adherent organisations.

(Position on 1st May 1954.)

ADMINISTRATIONS	Kilometres
GERMANY (Western).	
Deutsche Bundesbahn	30 509
ARGENTINE.	
Chemins de fer de l'Etat	17 673
AUSTRIA.	
Chemins de fer Fédéraux Autrichiens.	6 024
BELGIUM AND COLONY.	
a) *Belgium :*	
Société Nationale des Chemins de fer belges	4 973
Société Nationale des Chemins de fer vicinaux	2 803
Compagnie Générale d'Entreprises électriques et industrielles « Electrobel »	38
Railways économiques de Liège-Seraing et extensions	21
Compagnie belge de Chemins de fer et d'Entreprises	111
b) *Colony :*	
Chemins de fer du Bas-Congo au Katanga	2 510
Chemins de fer du Congo Supérieur aux Grands Lacs Africains.	849
Chemins de fer Vicinaux au Congo. .	839
Office d'Exploitation des Transports Coloniaux (OTRACO).	600
BURMA.	
Burma Railways	2 526

ADMINISTRATIONS	Kilometres
BRAZIL.	
Compagnie des Chemins de fer de Rio Grande do Sul	3 661
BULGARIA.	
Chemins de fer de l'Etat	3 280
CZECHOSLOVAKIA.	
Chemins de fer de l'Etat	13 196
DENMARK.	
Chemins de fer de l'Etat	2 785
Chemin de fer privé d'Aalborg. . . .	259
Chemin de fer de l'Est de Seeland . .	47
Chemin de fer de Lolland-Falster . .	104
EGYPT.	
Chemins de fer de l'Etat	4 733
FINLAND.	
Chemins de fer de l'Etat	4 854
FRANCE AND FRENCH UNION	
a) *France (Metropolitan)*:	
Société Nationale des Chemins de fer français	41 175
Chemins de fer Départementaux . . .	498

ADMINISTRATIONS	Kilometres
Société Générale des Chemins de fer Economiques	1 526
Chemins de fer Economiques du Nord.	121
Régie Autonome des Transports Parisiens.	186
Chemins de fer Secondaires du Nord-Est	65
Compagnie Générale de Voies ferrées d'intérêt local	340
b) *Other territories of the French Union :*	
Africa.	
Chemins de fer Algériens	4 355
Chemin de fer de Gafsa.	453
Compagnie fermière des Chemins de fer Tunisiens.	1 610
Chemins de fer de l'Afrique Equatoriale française et du Cameroun	1 014
Chemins de fer coloniaux de l'Afrique occidentale française et Togo.	4 216
Chemin de fer franco-éthiopien de Djibouti à Addis-Abeba	783
Chemins de fer de Madagascar	859
Chemins de fer du Maroc	1 091
Chemin de fer de la Méditerranée au Niger	275
Asia.	
Compagnie française des Chemins de fer de l'Indochine et du Yunnan.	100
Chemins de fer Royaux du Cambodge	385
Chemins de fer non concédés du Viêt-Nam.	908
THE COMMONWEALTH.	
a) *The United Kingdom of Great Britain and Northern Ireland and dependent overseas territories :*	
British Railways	30 968
London Transport Executive	341
East African Railways and Harbours.	5 005
Nigerian Railways	3 062
Malayan Railway	1 583
b) *Australia :*	
New South Wales Government Railways	9 835
Tasmanian Government Railways.	988
Victorian Government Railways	7 654
c) *New Zealand :*	
New Zealand Government Railways.	5 673
d) *Union of South Africa :*	
South African Railways and Harbours	21 555
e) *India :*	
Indian Government Railways	53 584
f) *Ceylon :*	
Ceylon Government Railway.	1 441
g) *Federation of Rhodesia and Nyasaland :*	
Rhodesia Railways	4 022
GREECE.	
Chemins de fer de l'Etat hellénique	1 286
Chemin de fer Pirée-Athènes-Péloponèse	815
Chemins de fer de Thessalie	233
HUNGARY.	
Chemins de fer de l'Etat hongrois	7 783
INDIA (see *The Commonwealth*).	
INDONESIA.	
Chemins de fer de l'Etat indonésien.	6 102
IRAN.	
Chemins de fer de l'Etat iranien	1 823

ADMINISTRATIONS	Kilometres
IRAQ.	
Iraq State Railways	1 660
REPUBLIC OF IRELAND.	
Coras Iompair Eireann	3 232
ITALY.	
Chemins de fer de l'Etat	16 389
Chemins de fer de la Méditerranée	845
Société Nationale de Chemins de fer et de Tramways	175
Chemins de fer du Nord de Milan	243
Ferrovie del Sud-Est	475
S. A. Torinese Tranvie Intercomunali	41
Société Vénitienne pour la Construction et l'Exploitation de Chemins de fer secondaires en Italie	290
Compania delle Ferrovie Danubio-Sava-Adriatico	310
Tramways électriques de Brescia	72
LUXEMBURG.	
Société Nationale des Chemins de fer Luxembourgeois	505
NORWAY.	
Chemins de fer de l'Etat	4 379
NETHERLANDS.	
Chemins de fer Néerlandais, S. A.	3 186
POLAND.	
Chemins de fer de l'Etat	17 900
PORTUGAL AND OVERSEAS TERRITORIES.	
a) *Continent :*	
Compagnie des Chemins de fer Portugais	3 571
b) *Overseas Territories :*	
Chemins de fer de l'Angola	948
Chemin de fer du Benguela	1 348
Chemin de fer du Mozambique	1 905
RUMANIA.	
Chemins de fer Roumains	9 767
SPAIN.	
Red Nacional de los Ferrocarriles Españoles (R. E. N. F. E.)	13 067
Compagnie Générale des Chemins de fer Catalans	201
SUDAN (ANGLO-EGYPTIAN).	
Sudan Railways	3 307
SWEDEN.	
Chemins de fer de l'Etat	15 090
Chemin de fer Nora-Bergslagen	173
Chemin de fer Nordmarks-Klarelfvens	171
Chemin de fer Oxelösund-Flen-Västmanlands	300
Chemin de fer Stockholm-Roslag	238
SWITZERLAND.	
Chemins de fer fédéraux	2 910
Chemins de fer des Alpes bernoises (Berne-Loetschberg-Simplon)	253
Chemin de fer Rhétique	391
Chemin de fer de Viège à Zermatt	44
Chemin de fer d'Yverdon à Sainte-Croix	25
Chemins de fer Fribourgeois	100
Chemin de fer Emmental-Burgdorf-Thun	170
SYRIA.	
Chemins de fer de l'Etat Syrien, Lignes du Nord	248
Chemin de fer de Damas-Hama et prolongements	583
TURKEY.	
Chemins de fer et Ports de l'Etat turc	7 110

ADMINISTRATIONS	Kilometres	ADMINISTRATIONS	Kilometres
UNITED STATES OF AMERICA.		**YUGOSLAVIA.**	
Delaware and Hudson Railroad Corporation	1 276		
Long Island Railroad	634	Chemins de fer Yougoslaves	9 461

AFFILIATED ORGANISATIONS

Association of American Railroads.
Compagnie Auxiliaire Internationale de Chemins de fer.
Compagnie Internationale des Wagons-Lits et des Grands Express Européens.
Deutsche Schlafwagen und Speisewagen Gesellschaft.
Federazione Nazionale Imprese Trasporti.
Office Central des Transports Internationaux par Chemins de fer.
Union Internationale des Chemins de fer.
Union des Chemins de fer Privés Suédois (Svenska Järnvägsföreningen).
Union des Voies Ferrées.

GENERAL LIST OF DELEGATES

Note. — An asterisk (*) means that a delegate is already a member of the Congress in some other capacity, is latter being inserted in brackets.

◆ = Present in London.

I. — Delegates of the Permanent Commission.

A. — PERMANENT COMMISSION.

President :

M. **De Vos,** Directeur Général de la Société Natio-le des Chemins de fer belges.

Vice-presidents :

J.M. **Goursat,** Directeur de la Région du Nord la Société Nationale des Chemins de fer français.
P. **Ghilain,** Directeur honoraire du Service du Ma-riel et des Achats de la Société Nationale des Chemins fer belges.

Members of the Executive Committee :

E. **Dorges,** Secrétaire Général Honoraire aux Tra-ux Publics et aux Transports, Délégué Général du inistre pour les Affaires Internationales au Ministère s Travaux Publics et des Transports de France.
The Rt. Hon. Lord **Hurcomb,** G.C.B., K.B.E., airman, British Transport Commission, 1947-1953.
Sir Gilmour **Jenkins,** K.C.B., K.B.E., M.C., Per-nent Secretary, Ministry of Transport and Civil viation (Great-Britain).

Ex-Presidents of Session, ex-officio members :

Ing. G. **di Raimondo,** Directeur Général des Chemins fer de l'Etat italien.
Ibrahim Fahmy **Kerim.**
Dr. W. **Meile,** ancien Président de la Direction nérale des Chemins de fer fédéraux suisses.

Members :

Mohamed Aref **Aboul Ata,** Sous-Secrétaire d'Etat Ministère des Communications d'Egypte.
Armand, Directeur Général de la Société Nationale Chemins de fer français.
F. Ch. **Badhwar,** Chairman, Railway Board, Ministry Railways, Government of India.
Sir John **Benstead,** C.B.E. Deputy Chairman, British nsport Commission.
R. **Besnard,** Chef de service adjoint au Directeur néral des Chemins de fer et des Transports, Ministère Travaux publics et des Transports. (France.)
David **Blee,** Chief of Commercial Services, British nsport Commission.
◆ J. **Bouciqué,** Directeur du Service de la Voie de la Société Nationale des Chemins de fer belges.
Ch. **Boyaux,** Directeur Général Adjoint de la Société Nationale des Chemins de fer français.
◆ Dipl.-Ing. A. **Brill,** Direktor der Hauptverwaltung und Leiter der Maschinentechnischen Abteilung in der Hauptverwaltung der Deutschen Bundesbahn.
R. **Claudon,** Inspecteur Général des Ponts et Chaussées, Vice-Président du Conseil d'administration de la Société Nationale des Chemins de fer français.
M. W. **Clement,** Chairman of the Board, Pennsylvania Railroad Company.
◆ Dr. R. **Cottier,** Directeur de l'Office Central des Transports Internationaux par Chemins de fer.
◆ T.C. **Courtney,** Chairman of the Coras Iompair Eireann.
◆ M. **Crem,** Directeur du Service de l'Exploitation de la Société Nationale des Chemins de fer belges.
Csanadi, Directeur Général des Chemins de fer de l'Etat hongrois.
◆ Dr. Ing. A. **Cuttica,** Chef du Service du Matériel et de la Traction des Chemins de fer de l'Etat italien.
◆ Ph. **Dargeou,** Directeur du Service central du Mouvement de la Société Nationale des Chemins de fer français.
◆ J. **de Aguinaga,** Director General de Ferrocarriles, Tranvias y Transportes por carretera (Espagne).
◆ F.Q. **den Hollander,** Président des Chemins de fer Néerlandais, S.A.
Ing. V. **Desic,** Professeur à la Faculté Technique de Belgrade, Conseiller permanent du Ministère des Chemins de fer de la République fédérative populaire yougoslave.
◆ M. **Dias Trigo,** Directeur des Services d'Exploitation et du Matériel de la Direction des Transports terrestres au Ministère des Travaux publics et des Communications du Portugal.
◆ Sir John **Elliot,** Chairman of the London Transport Executive.
W.T. **Faricy,** President, Association of American Railroads.
◆ Dr.-Ing. F. **Fazio,** Conseiller d'Administration aux Chemins de fer de l'Etat italien.
◆ Prof. Dr.-Ing. E. **Frohne,** Erster Präsident der Deutschen Bundesbahn.
◆ J.M. **Garcia-Lomas,** Directeur du Réseau National des Chemins de fer espagnols.
◆ K. W. C. **Grand,** Chief Regional Manager, Western Region, British Railways.
◆ Dr. **Gschwind,** Président de la Direction Générale des Chemins de fer fédéraux suisses.

◆ Ranald J. **Harvey,** Consulting Engineer to the Government of New Zealand.

R. **Hoens,** Directeur Général de la Société Nationale belge des Chemins de fer vicinaux.

◆ Dr. A. **Huyberechts,** Directeur Général Adjoint de la Société Nationale des Chemins de fer belges.

◆ M. **Jacobshagen,** Direktor der Hauptverwaltung und Leiter der Betriebsabteilung in der Hauptverwaltung der Deutschen Bundesbahn.

Ing. Ch. **Kalitzov,** Chef de la Section du Mouvement des Chemins de fer et des Ports de l'Etat bulgare.

A. **Kriz,** Ingénieur, Conseiller supérieur de Section au Ministère des Communications de la République tchécoslovaque.

◆ R. **Kunz,** Directeur de l'Office fédéral des transports (Suisse).

◆ Dr. N. **Laloni,** Directeur Général Adjoint des Chemins de fer de l'Etat italien.

◆ Dr.-Ing. G. **Lasz,** Conseiller d'Administration aux Chemins de fer de l'Etat italien.

◆ F. L. **Lehtinen,** Directeur en Chef de la Direction Générale des Chemins de fer de l'Etat de Finlande.

◆ R. **Lévi,** Directeur des Installations fixes de la Société Nationale des Chemins de fer français.

◆ W. H. W. **Maass,** Advisory Engineer to the High Commissioner for the Union of South Africa.

◆ M. **Malderez,** Secrétraire Général du Ministère des Communications de Belgique.

◆ Ing. F. **Marin,** Vice-Directeur Général des Chemins de fer de l'Etat italien.

◆ P. **Nolet de Brauwere,** Secrétaire Général de la Société Nationale des Chemins de fer belges.

J.H. **Nuelle,** President, Delaware & Hudson Railroad Corporation.

◆ G. **Olivier,** Directeur Général Adjoint de la Société Nationale des Chemins de fer belges.

A. **Peña Boeuf,** Président du Conseil d'Administration du Réseau National des Chemins de fer espagnols.

◆ Dr. Ing. V. **Perrone,** Inspecteur Général Supérieur de la Motorisation Civile et des Transports concédés (Italie).

◆ A. **Porchez,** Directeur Général Adjoint à la Société Nationale des Chemins de fer français.

Abdel Moneim **Rashad,** Directeur Général adjoint des Chemins de fer de l'Etat égyptien.

◆ X. **Remy,** Directeur des Chemins de fer Fribourgeois et Président de l'Union d'Entreprises suisses de Transport.

◆ A. M. **Rizk,** Directeur Général des Chemins de fer de l'Etat égyptien.

◆ General Sir Brian H. **Robertson,** Bart., G.C.B., G.B.E., K.C.M.G., K.C.V.O., D.S.O., M.C., Chairman, British Transport Commission.

◆ Dr. M. **Schantl,** Secrétaire Général des Chemins de fer fédéraux autrichiens.

Dr. F. **Schelp,** Präsident der Deutschen Bundesbahn.

◆ H. E. **Stokke,** Directeur Général des Chemins de fer de l'Etat norvégien.

◆ E. D. **Terkelsen,** Directeur Général des Chemins de fer de l'Etat danois.

◆ J. C. L. **Train,** C.B.E., M.C., Member, British Transport Commission.

◆ **Tuja,** Secrétaire Général de l'Union internationale des Chemins de fer.

◆ E. G. J. **Upmark,** Directeur Général en Chef des Chemins fer de l'Etat suédois.

F. Perez **Villamil,** Directeur adjoint du Réseau National des Chemins de fer espagnols.

Wagner, Ingénieur en Chef au Ministère des Communications de Pologne.

R. B. **White,** President, Baltimore & Ohio Railroad Company.

◆ Lt.-Col. G. R. S. **Wilson,** C.B.E., Chief Inspecting Officer of Railways, Ministry of Transport and Civil Aviation (Great-Britain).

Hussein Abu **Zeid,** Ministre des Communications d'Egypte.

Honorary President :

◆ F. H. **Delory,** Directeur Général honoraire de la Société Nationale des Chemins de fer belges.

Members of Honour :

R. **da Costa Couvreur,** ancien Président du Conseil supérieur des Travaux publics au Ministère des Travaux publics et des Communications du Portugal.

◆ U. **Lamalle,** Directeur Général honoraire de la Société Nationale des Chemins de fer belges, professeur de cours de chemins de fer à l'Université de Louvain.

General Secretary :

◆ P. **Ghilain** (*).

Assistant secretaries :

◆ J. **Dubus,** Ingénieur en Chef attaché à la Direction Générale de la Société Nationale des Chemins de fer belges.

◆ E. **Uytborck,** Ingénieur Principal du Service du Matériel et des Achats à la Société Nationale des Chemins de fer belges.

Chief of the Secretariat :

◆ J. **Dumont.**

B. — BRITISH ORGANISING COMMITTEE.

a) COMMITTEE OF HONOUR :

President of Honour :

◆ H.R.H. THE DUKE OF GLOUCESTER.

Vice-President of Honour :

◆ The Rt. Hon. Alan Tindal **Lennox-Boyd,** M.P., Minister of Transport and Civil Aviation.

President of the Session :

◆ General Sir Brian H. **Robertson** (*), Bart., G.C.B., G.B.E., K.C.M.G., K.C.V.O., D.S.C., M.C., Chairman, British Transport Commission. (Member of the Permanent Commission).

Vice-Presidents of the Session :

Sir John **Benstead** (*) C.B.E., Deputy Chairman, ish Transport Commission (Member of the Perma- t Commission).

Members :

A. H. E.**Molson,** M. P., Joint Parliamentary Secretary Ministry of Transport and Civil Aviation.
The Rt. Hon. Alfred **Barnes,** J.P., M.P., Minister Transport 1945-1951.
Victor **Mishcon,** D.L.J.P., Chairman of the London unty Council.
Alderman Charles P. **Russell,** C.V.O., J.P., The ht Worshipful the Mayor of the City of Westminster.
Hubert **Hull,** C.B.E., President, Transport Tribunal.
Major Egbert **Cadbury,** D.S.C., D.F.C., D.L., J.P., airman, Central Transport Consultative Committee.
W.P. **Shepherd-Barron,** M.C., T.D., President, The titution of Civil Engineers.
Dr. R.W. **Bailey,** F.R.S., President, The Institution Mechanical Engineers.
H. **Bishop,** C.B.E., President, The Institution of ctrical Engineers.
Sir John **Elliot,** (*) President, The Institute of Trans- t. (Member of the Permanent Commission.)
R.C. **Bond,** President, The Institution of Locomotive gineers.
J.H. **Fraser,** O.B.E., President, The Institution of lway Signal Engineers.
M.G.R. **Smith,** M.B.E., President, The Permanent y Institution.

b) ORGANISING COMMISSION.

Members :

T.H. **Baker,** British Transport Hotels and Catering vices. (Member of Arrangements Committee.)
D.S.M. **Barrie,** M.B.E., Public Relations Officer, ish Railways. (Member of Arrangements Committee.)
J.G. **Baty,** General Secretary, Associated Society Locomotive Engineers and Firemen.
David **Blee** (*), Chief of Commercial Services, British nsport Commission. (Member of the Permanent mmission.)
S. **Bollon,** Assistant Publicity Officer, British Railways. mber of Arrangements Committee.)
H.G. **Bowles,** Principal Assistant to Chief Regional nager, Western Region, British Railways. (Mem- of Arrangements Committee.)
J.H. **Brebner,** O.B.E., Chief Public Relations and licity Officer, British Transport Commission.
J.S. **Campbell,** General Secretary, The National on of Railwaymen.
Miss M.B.A. **Churchard,** O.B.E., Assistant Secre- , Ministry of Transport and Civil Aviation.
John **Cliff,** D.L., Deputy Chairman, London Trans- Executive.
B.W.C. **Cooke,** Agent, British Railways.
E.S. **Cox,** Executive Officer (Design), British Rail- s. (Member of Arrangements Committee.)
P.J.E. **Dalmahoy,** C.B., Under-Secretary, Ministry Transport and Civil Aviation.
Sir John **Elliot** (*), Chairman, London Transport cutive. (Member of the Permanent Commission.)
A.H. **Grainger,** Member, London Transport Executive.
◆ K.W.C. **Grand** (*), Chief Regional Manager, Western Region, British Railways. (Member of the Permanent Commission.)
◆ R.H. **Hacker,** Chief Officer (Continental), British Railways. (Member of Arrangements Committee.)
◆ J.L. **Harrington,** Chief Officer (Marine and Administration), British Railways. (Chairman of Arrangements Committee.)
◆ A.A. **Harrison,** Chief Co-ordination Officer, British Railways. (Member of Arrangements Committee.)
◆ F.G. **Hole,** Chief of Hotels and Catering Services, British Transport Commission.
◆ E.S. **Hunt,** Assistant Chief Regional Manager, London Midland Region, British Railways. (Member of Arrangements Committee.)
◆ The Rt. Hon. Lord **Hurcomb** (*), G.C.B., K.B.E., Chairman, British Transport Commission 1947-1953 (Member of the Permanent Commission.)
◆ Sir Gilmour **Jenkins** (*), K.C.B., K.B.E., M.C., Permanent Secretary, Ministry of Transport and Civil Aviation. (Member of the Permanent Commission.)
◆ David R. **Lamb,** Agent, British Railways.
◆ Brig. Ch.A. **Langley,** C.B.E., M.C., Inspecting Officer of Railways, Ministry of Transport and Civil Aviation.
◆ Reep **Lintern,** Under-Secretary, Ministry of Transport and Civil Aviation.
Gavin **Martin,** General Secretary, The Confederation of Shipbuilding and Engineering Union.
◆ Denis **O'Neill,** Under-Secretary, Ministry of Transport and Civil Aviation.
◆ S.E. **Parkhouse,** O.B.E., Chief of Operating Services British Transport Commission. (Member of Arrangements Committee.)
◆ F.A. **Pope,** C.I.E., Member, British Transport Commission.
◆ P.D. **Proctor,** C.B., Deputy Secretary, Ministry of Transport and Civil Aviation.
◆ J. **Ratter,** C.B.E., Chief Officer (Civil Engineering), British Railways. (Member of Arrangements Committee.)
◆ R.M. **Robbins,** Secretary, London Transport Executive. (Member of Arrangements Committee.)
◆ R.A. **Smyrk,** Staff Manager, Messr. Thos. Cook and Son Ltd. (Member of Arrangements Committee.)
◆ J.C.L. **Train** (*), C.B.E., M.C., Member, British Transport Commission. (Member of the Permanent Commission.)
◆ A.B.B. **Valentine,** Member, London Transport Executive.
◆ W.J.P. **Webber,** General Secretary, Transport Salaried Staffs' Association.
◆ A.J. **White,** Assistant Chief Regional Officer, Eastern Region, British Railways. (Member of Arrangements Committee.)
◆ Lt. Col. G.R.S. **Wilson** (*), C.B.E., Chief Inspecting Officer of Railways, Ministry of Transport and Civil Aviation. (Member of the Permanent Commission.)
◆ Sir Reginald Holmes **Wilson,** Member, British Transport Commission.
◆ F.J. **Wymer,** C.B.E., Assistant Chief Regional Officer, Southern Region, British Railways. (Member of Arrangements Committee.)

General Secretary :

◆ C.E. **Whitworth,** Assistant to Chief Officer (Administration), British Transport Commission.

Assistant Secretary :

◆ F.C. **Pluck.**

Chief of the Secretariat :

◆ R.H. **Kitching.**

Technical adviser of the Secretariat :

◆ C.E. **Dunton,** Chief Civil Engineer, London Transport Executive.

Secretariat - Scottish Committee :

◆ A. **Stewart,** Assistant to Chief Regional Manager, Scottish Region, British Railways.

C. — REPORTERS ON THE QUESTIONS SUBMITTED TO THE CONGRESS.

◆ Bengt **Adamson,** Superintendent of the Operating Department, Swedish State Railways.
◆ R. **Berghmans,** Inspecteur en Chef à la Direction du Personnel et des Services Sociaux de la Société Nationale des Chemins de fer belges.
José Chedas **Bogarim,** Ingénieur en Chef de la Division du Matériel de la Direction Générale des Transports terrestres au Ministère des Communications (Portugal).
◆ O. Hjelte **Claussen,** Ingénieur principal de la Voie, Chemins de fer de l'Etat danois.
◆ Dr. F.F.C. **Curtis,** Architect, British Railways.
◆ J.F.M. **De Boeck,** ingénieur en Chef au Service Technique de la Société Nationale des Chemins de fer Vicinaux (Belgique).
◆ Ing. Manlio **Diegoli,** Inspecteur en Chef Supérieur au service du Matériel et de la Traction des Chemins de fer de l'Etat italien.
◆ Prof. A. **Dobmaier,** Direktor der Hauptverwaltung und Leiter der Bauabteilung in der Hauptverwaltung der Deutschen Bundesbahn.
◆ Dr. G. **Dreyer,** Secrétaire Général adjoint des Chemins de fer Fédéraux suisses.
◆ R. **Dugas,** Directeur des Etudes Générales de la Société Nationale des Chemins de fer français.
◆ Ch. **Feyrabend,** Ingénieur en Chef, Chef de la Division de l'Entretien au Service de la Voie et des Bâtiments de la Région Sud-Est de la Société Nationale des Chemins de fer français.
◆ J.H. **Fraser** (*), O.B.E., Chief Officer Engineering (Signal and Telecommunications), British Railways.
◆ Dipl. Ing. J. **Frischauf,** Referent für Fernmeldewesen in der Generaldirektion der Oesterreichischen Bundesbahnen.
◆ Dr.-Ing. H. **Grünewald,** Bundesbahnrat, Bundesbahn-Zentralamt, München.
◆ Ing. C. **Guzzanti,** Professeur de Traction électrique à l'Université de Pise, Inspectorat Général de la Motorisation Civile et des Transports Concédés (Italie).
◆ S.G. **Hearn,** O.B.E., Operating Superintendent, London Midland Region, British Railways.
◆ Dr. A. **Huyberechts** (*), Directeur Général Adjoint de la Société Nationale des Chemins de fer belges. (Member of the Permanent Commission.)
◆ F. **Lemass,** General Manager, Coras Iompair Eireann (Ireland).
◆ C.T. **Long,** Assistant Chief Mechanical Engineer (Motive Power), South African Railways.
◆ J. **Nogués,** Sous-Directeur du Réseau National des Chemins de fer espagnols.
◆ T.S. **Pick,** Chief Electrical Engineer, London Transport Executive.
◆ Ing. L. **Pratesi,** Inspectorat Général de la Motorisation Civile et des Transports concédés (Italie). (Co-rapporteur.)
◆ L. **Ripert,** Ingénieur en chef, Chef du Service de la Voie et des Travaux de la Société Générale des Chemins de fer Economiques (France).
◆ Dr.-Ing. habil. G. **Schramm,** Referent fûr Oberbau bei der Hauptverwaltung der Deutschen Bundesbahn.
◆ R. **Sörvik,** Chief Signal Engineer, Norwegian State Railways.
◆ R. **Squilbin,** Ingénieur Principal au Service du Matériel et des Achats de la Société Nationale des Chemins de fer belges.
◆ Dr. J.P.B. **Tissot van Patot,** Chef de Division du Cabinet et de la Politique Générale des Chemins de fer Néerlandais.
◆ V. **Venkataramayya,** Deputy Chief Controller of Standardization (Ministry of Railways) (India).
◆ S.B. **Warder,** Chief Officer (Electrical Engineering), British Railways.

D. — PRINCIPAL SECRETARIES.

◆ J. **Dubus** (*), Ingénieur en Chef attaché à la Direction Générale de la Société Nationale des Chemins de fer belges.
◆ E. **Uytborck** (*), Ingénieur Principal du Service du Matériel et des Achats à la Société Nationale des Chemins de fer belges.
◆ H. **Lenfant,** Ingénieur Principal honoraire de la Société Nationale des Chemins de fer belges;
◆ A. **Marchal,** Ingénieur Principal du Service de l'Exploitation à la Société Nationale des Chemins de fer belges.
◆ N. **Charlier,** Ingénieur à la Société Nationale des Chemins de fer Vicinaux (Belgique).

E. — SECTION SECRETARIES.

◆ A.E. **Beresford,** Mechanical and Electrical Engineer's Department, Eastern Region, British Railways.
◆ E.G. **Brentnall,** Assistant Signal and Telecommunications Engineer, London Midland Region, British Railways.
◆ B. **Broca,** Chef de Section Principal à la Société Nationale des Chemins de fer français.
◆ M. **Gaveau,** Agent d'Etudes Administratives, Adjoint au Représentant Général de la S.N.C.F. à Londres.
◆ J.H. **Glendinning,** District Engineer, Eastern Region, British Railways.

R. **Hommerin,** Inspecteur de première classe au rvice du Matériel et de la Traction de la Région Sud-Ouest (PC de Limoges) de la Société Nationale s Chemins de fer français.
R.E.F. **Oggier,** Executive Assistant, Development d Research Office, London Transport Executive.
P.I. **Punt,** British Railways.

◆ F. **Romann,** Inspecteur Divisionnaire à la Direction des Installations Fixes (Division des Installations de Sécurité) de la Société Nationale des Chemins de fer français;
◆ J. **Unal,** Ingénieur, Chef de la Subdivision de l'Entretien de la Région de la Méditerranée de la Société Nationale des Chemins de fer français.

II. — Members appointed by adherent Governments and by affiliated Railway Administrations and Organisations.

— GOVERNMENTS AND THEIR DELEGATES.

Argentine.

J. **Martinez,** Ingénieur.

Belgique (Belgium).

Ministère des Communications :

M. **Malderez** (*) Secrétaire Général du Ministère des ommunications (Member of the Permanent Commission).
J. **Vrebos,** Directeur Général de l'Administration des ansports.
J. **Gordts,** Conseiller-Chef de Service à l'Administion des Transports.

Ministère des Colonies :

G. **Feytmans,** Inspecteur Royal des Colonies f.f.

Danemark (Denmark).

Ministère des Travaux publics :

P. **Christensen,** Secretaire Général au Ministère des vaux publics.
E.D. **Terkelsen** (*), Directeur Général des Chemins fer (Member of the Permanent Commission).
J.K.F. **Jensen,** Secrétaire de la Fédération Danoise Travailleurs des Chemins de fer. (Dansk Jernbane bund).

Egypte (Egypt).

Ministère des Communications :

Ahmed Mohamed **Rizk** (*), General Manager the Egyptian State Railways (Member of the manent Commission.)
Abdel Moneim Mohamed **Azmi,** Deputy Chief ineer, Way and Works, Egyptian State Railways.
Abdel Ghaffar **El-Khafif,** Deputy Chief Engineer, hanical Department, Egyptian State Railways.
Mahmoud **Ghoneim,** Assistant Traffic and Goods ager, Egyptian State Railways.

Espagne (Spain).

Ministère du Fomento :

. **de Aguinaga** (*), Directeur Général des Chemins er, Tramways et Transports par Route. (Member ne Permanent Commission.)

Finlande (Finland).

◆ F.L. **Lehtinen** (*), Directeur en Chef des Chemins de fer de l'Etat de Finlande (Member of the Permanent Commission.)
◆ W.I. **Hakkimen,** Chef de Section au Ministère des Transports et des Travaux Publics.

France.

Ministère des Travaux publics, des Transports et du Tourisme :

◆ E. **Dorges** (*), Secrétaire Général Honoraire aux Travaux publics et aux Transports, Délégué Général du Ministre pour les Affaires Internationales (Member of the Permanent Commission.)
◆ A. **Doumenc,** Directeur Général des Chemins de fer et des Transports.
◆ R. **Besnard** (*), Chef de Service Adjoint au Directeur Général des Chemins de fer et des Transports (Member of the Permanent Commission.)
◆ P.A. **Favière,** Inspecteur Général des Ponts et Chaussées, Chef du Service du Contrôle Technique des Chemins de fer.
◆ M. **Créange,** Ingénieur en Chef des Ponts et Chaussées au Service du Contrôle Technique des Chemins de fer.
◆ P.M. **Julien,** Ingénieur en Chef des Ponts et Chaussées au Service du Contrôle Technique des Chemins de fer.
◆ M. **Prot,** Ingénieur en Chef des Ponts et Chaussées, au Service du Contrôle Technique des Chemins de fer.

Grande-Bretagne (Great Britain).

Ministry of Transport and Civil Aviation :

◆ Sir Gilmour **Jenkins** (*), K.C.B., K.B.E., M.C., Permanent Secretary, Ministry of Transport and Civil Aviation. (Member of the Permanent Commission, Member of the British Organising Commission.)
◆ G.F. **Stedman,** C.B., M.C., Under-Secretary, Ministry of Transport and Civil Aviation.
◆ S.J. **Page,** C.B., M.C., Adviser on Inland Transport Charges, Ministry of Transport and Civil Aviation.
◆ I. **Wild,** C.B., C.M.G., O.B.E., Director of Finance, Ministry of Transport and Civil Aviation.
◆ E.W. **Godfrey,** O.B.E., Assistant Secretary, Ministry of Transport and Civil Aviation.
◆ Lt.-Col. G.R.S. **Wilson** (*), C.B.E., Chief Inspecting Officer of Railways, Ministry of Transport and Civil Aviation. (Member of the Permanent Commission.)

◆ Col. D. **McMullen,** Inspecting Officer of Railways, Ministry of Transport and Civil Aviation.
◆ Col. W.P. **Reed,** O.B.E., Inspecting Officer of Railways Ministry of Transport and Civil Aviation.
◆ Brig. A.E.M. **Walter,** C.B.E., Director, International Inland Transport Branch, Ministry of Transport and Civil Aviation.
◆ W.R. **Maunder,** M.B.E., Technical Officer, Railways Division, Ministry of Transport and Civil Aviation.
◆ L.J. **Taylor,** Chief Inspector of Postal Services, Post Office.
◆ A.M. **Morgan,** Assistant Secretary, Industrial Relations Department, Ministry of Labour and National Service.
◆ Brig. G.J. **Bryan,** C.B.E., Director of Transportation, The War Office.
◆ R.W. **Foxlee,** C.M.G., C.B.E., M. Inst. C.E., Engineer-in-Chief, Crown Agents for Overseas Governments and Administrations.
◆ C.G. **Conway,** Project Engineer, Chief Scientists Division, Ministry of Fuel and Power.
◆ A.J. **Maguire,** Assistant Director, R.E.2, (Branch of Directorate of Royal Engineer Equipment), Ministry of Supply.

Grèce (Greece).

Ministère des Communications :

◆ A. **Lebessis,** Directeur des Voies ferrées au Ministère des Communications.

Inde (India).

Ministry of Railways (Railway Board) :

◆ F. Ch. **Badhwar** (*), Chairman, Railway Board, Government of India. (Member of the Permanent Commission.)

Italie (Italy).

Ministère des Transports :

B. **Mattarella,** Ministre des Transports.
◆ Dr.-Ing. Vito **Perrone** (*), Inspecteur Général Supérieur de la Motorisation Civile et des Transports concédés. (Member of the Permanent Commission.)
◆ Prof. G. **Pescatore,** Conseiller d'Etat.
◆ Prof. Ing. C. **Guzzanti** (*), Inspectorat Général de la Motorisation Civile et des Transports concédés, Professeur de Traction électrique à l'Université de Pise (rapporteur).
A. **Buccellato,** Fonctionnaire au Ministère des Transports.
◆ Ing. L. **Pratesi** (*), co-rapporteur.

Luxembourg (Luxemburg).

Commissariat du Gouvernement luxembourgeois pour les Chemins de fer :

◆ A. **Clemang,** Commissaire du Gouvernement pour les Chemins de fer.

Norvège (Norway).

Ministère des Travaux Publics :

◆ H.E. **Stokke** (*), Directeur Général des Chemins de fer de l'Etat norvégien. (Member of the Permanent Commission.)

Pays-Bas (Netherlands).

Ministère des Transports et du Waterstaat :

◆ G.H. **Dijkmans van Gunst,** Docteur en Droit, Directeur de la Division « Transports » à la Direction Générale des Transports.
◆ J. **Slim,** Ingénieur en Chef à la Division « Chemins de fer » à la Direction Générale des Transports.
K. **Vonk,** Directeur Général suppléant de la Marine Marchande.

Pologne (Poland).

Ministère des Chemins de fer :

◆ L. **Gehorsam,** Directeur de l'Institut des Etudes Scientifiques Ferroviaires.
◆ P. **Jaros,** Chef de la Section Télécommunications, Institut des Etudes Scientifiques Ferroviaires.

Portugal.

Ministère des Communications :

◆ Mario **Dias Trigo** (*), Directeur des Services d'Exploitation et du Matériel de la Direction Générale des Transports terrestres (Member of the Permanent Commission.)

Inspecção Superior do Fomento Ultramarino :

F. dos Santos Pinto **Teixeira,** Ingénieur, Inspecteur Général, ancien Directeur Général des Ports, Chemins de fer et Transports au Mozambique.
◆ E. **Salles Lane,** Ingénieur, Président du Conseil d'Administration de la Compagnie du Chemin de fer d'Amboim (Angola).

Suède (Sweden).

Ministère des Communications :

◆ E.G.J. **Upmark** (*), Directeur Général en Chef des Chemins de fer de l'Etat suédois. (Member of the Permanent Commission.)
◆ F. **Hagstrand,** Chef des Services du Ministère des Communications.
◆ A. **Callans,** Chef de Section au Ministère des Communications.
◆ H. **Blomgren,** Président de l'Association Syndicale du Personnel des Chemins de fer.

Suisse (Switzerland).

Office Fédéral des Transports :

◆ R. **Kunz** (*), Directeur de l'Office Fédéral des Transports. (Member of the Permanent Commission.)
◆ O. **Hirzel,** Chef de Section à l'Office Fédéral des Transports.
◆ H.R. **Meyer,** Délégué aux Questions Economiques du Département Fédéral des Postes et des Chemins de fer.

Viet-Nam.

◆ **Le-Quang-Huy,** Ingénieur en Chef des Régies Ferroviaires de la France d'Outre-Mer, Ministre des Travaux Publics et des Communications.

Yougoslavie (Yugoslavia).

B. **Bogavac,** Directeur Général des Chemins de fer ougoslaves.

— DELEGATES OF THE AFFILIATED RAILWAY ADMINISTRATIONS.

Allemagne Occidentale (Western Germany).

Deutsche Bundesbahn :

Prof. Dr.-Ing. E. **Frohne** (*), Erster Präsident der Deutschen Bundesbahn. (Member of the Permanent ommission.)
Dr. F. **Schelp** (*), Prâsident der Deutschen Bundesahn (Member of the Permanent Commission.)
A. **Brill** (*), Direktor der Hauptverwaltung der D.B. Member of the Permanent Commission.)
M. **Jacobshagen** (*), Direktor der Hauptverwaltung er D.B. (Member of the Permanent Commission.)
Prof. Dr.-Ing. W. **Schmitz,** Bundesbahndirektor.
Dr.-Ing. habil. G. **Schramm** (*), Hauptverwaltungsrat Reporter).
Dr.-Ing. H. **Grünewald** (*), Bundesbahnrat (Reporer).
Dr. W. **Pischel,** Direktor der Hauptverwaltung der .B.
Prof. A. **Dobmaier** (*), Direktor der Hauptverwaltung der D.B. (Reporter).
Dr. H. **Kirste,** Hauptverwaltungsrat.
F. **Flemming,** Hauptverwaltungsrat.
W. **Klüsche,** Hauptverwaltungsrat.
Dr. H. **Blüher,** Hauptverwaltungsrat.
W. **Singelmann,** Bundesbahnamtsrat.
Dr. Th. **Molter,** Hauptverwaltungsdirigent.

Autriche (Austria).

Chemins de fer fédéraux autrichiens :

V. **Übeleis,** Minister a. D., Generaldirektor.
Dr. M. **Schantl** (*), Generalsekretär. (Member f the Permanent Commissiön.)
Dipl. Ing. J. **Frischauf** (*), Referent für Fernmeldeesen (Reporter).
J. **Sterba,** Sachbearbeiter der Allgemeinen Angeleenheiten der Internationalen Eisenbahnverbände.

Belgique et Colonie (Belgium and Colony).

a) BELGIUM.

Société Nationale des Chemins de fer belges :

M. **De Vos** (*), Directeur Général, President of the ermanent Commission of the Association.
G. **Olivier** (*), Directeur Général adjoint. (Member the Permanent Commission.)
Dr. A. **Huyberechts** (*), Directeur Général adjoint Member of the Permanent Commission and Reporter.)
P. **Nolet de Brauwere** (*), Secretaire Général .(Member of the Permanent Commission.)
M. **Crem** (*), Directeur du Service de l'Exploitation Member of the Permanent Commission.)
A. **Brouckaert,** Directeur du Service du Matériel des Achats.
◆ J. **Bouciqué** (*), Directeur du Service de la Voie. (Member of the Permanent Commission.)
◆ P. **Bouckaert,** Ingénieur en Chef au Service de la Voie.
◆ R. **Berghmans** (*), Inspecteur en Chef à la Direction du Personnel et des Services sociaux (Reporter).
◆ G. **Moulart,** Ingénieur en Chef au Service de l'Exploitation.
◆ L. **Devillers,** Ingénieur en Chef au Service de l'Electricité et de la Signalisation.
◆ F. **Baeyens,** Ingénieur en Chef au Service du Matériel et des Achats.
◆ A. **Hance,** Ingénieur Principal au Service de l'Electricité et de la Signalisation.
◆ R. **Squilbin** (*), Ingénieur Principal au Service du Matériel et des Achats (Reporter).
◆ J. **Dubus** (*), Ingénieur en Chef à la Direction Générale (Principal Secretary).
◆ E. **Uytborck** (*), Ingénieur Principal au Service du Matériel et des Achats (Principal Secretary).
◆ A. **Marchal** (*), Ingénieur Principal au Service de l'Exploitation (Principal Secretary).

Société Nationale des Chemins de fer vicinaux :

◆ W. **Vrielynck,** Directeur Général Adjoint.
◆ H. **Dulieu,** Ingénieur en Chef, Chef de Groupe.
◆ N. **Charlier** (*), Ingénieur (Principal Secretary).
◆ J.F.M. **De Boeck** (*), Ingénieur en Chef (Reporter).

Compagnie générale d'Entreprises électriques et industrielles « Electrobel » :

◆ G. **Ithier,** Ingénieur, Vice-Président.

Railways économiques de Liège-Seraing et extensions :

◆ L. **Renard,** Directeur Adjoint à l'Electrorail, Ingénieur Conseil à la Société.

Compagnie belge de Chemins de fer et d'Entreprises :

◆ L. **Depoorter,** Administrateur-Délégué.

b) COLONY.

Chemin de fer du Bas-Congo au Katanga :

P. **Sorel,** Administrateur-Délégué.
◆ M. **Van Mulders,** Administrateur-Directeur.
◆ J. **De Busschere,** Administrateur-Directeur.
◆ G. **Wenes,** Directeur Général en Afrique.
◆ C. **Delelienne,** Directeur-Adjoint à Bruxelles.
◆ L. **Van Simaeys,** Secrétaire Général.
◆ E. **Limet,** Ingénieur en Chef.

Office d'exploitation des transports coloniaux « Otraco » :

◆ E. **Voordecker,** Administrateur-Gérant.
◆ Ch. **Richelot,** Directeur Général des Services Techniques.

Chemins de fer vicinaux du Congo :

◆ A. **Dhanens,** Directeur Général.
◆ M. **Duquesne,** Ingénieur en Chef, Directeur Technique.

Birmanie (Burma),

Burma Railways :

◆ U. **Kyaw Myint,** District Engineer.

Danemark (Denmark).

Chemins de fer de l'Etat danois ;

◆ E.D. **Terkelsen** (*), Directeur Général. (Member of the Permanent Commission.)
◆ Th. **Engqvist,** Directeur des Voies et Bâtiments.
◆ C.C.H. **Christensen,** Directeur de la Traction et du Matériel.
◆ N.C.D. **Johnsen,** Directeur de l'Exploitation.
◆ W. **Herschend,** Directeur de Région.
◆ B. **Vejlö,** Ingénieur Principal.
◆ O. Hjelte **Claussen** (*), Ingénieur Principal (Reporter).
◆ P. **Harboe,** Directeur.

Chemin de fer privé d'Aalborg :

◆ G. Ch. **Rendbeck,** Avocat à la Cour Supérieure, Président de la Direction du Chemin de fer privé d'Aalborg.
◆ J.A. **Larsen,** Maire, Membre de la Direction.

Chemin de fer de Lolland-Falster :

◆ H. **Tiemroth,** Secretaire.

Egypte (Egypt).

The Egyptian State Railways :

◆ Ahmed Mohamed **Rizk** (*), General Manager. (Member of the Permanent Commission.)
◆ Adli Milik **Hanna,** Engineer, Projects Office, Way and Works Department.
◆ Hassan **El-Sorr,** Engineer, Projects Office, Way and Works Department.
◆ Ahmed Hamed **Khairy,** District Locomotive Superintendent.
◆ Abdul Hadi **Salah-el-Dine,** Electrical Engineer.
◆ Mohamed Anwar **Hassouna,** District Traffic Superintendent, Upper Egypt.
◆ Mahmoud **Ahmed,** Signal Engineer.

Espagne (Spain).

Réseau National des Chemins de fer Espagnols :

P. **Gonzales Bueno,** Vice-Président du Conseil d'Administration.
◆ J.M. **Garcia-Lomas** (*), Directeur. (Member of the Permanent Commission.)
◆ A. **Moreno,** Directeur Adjoint.
M. **Macias,** Sous-Directeur, Chef du Département Commercial.
◆ J. **Nogués** (*), Sous-Directeur (Reporter).
◆ M. **Maldonado,** Ingénieur, Chef du Service du Matériel et de la Traction.
◆ M. **Silvela,** Ingénieur, Chef du Service de l'Exploitation.

Compagnie générale des Chemins de fer catalans :

◆ A. **Peñarroja Esbri,** Président du Conseil.
G. **Turell Moragas,** Sous-Directeur.

Finlande (Finland).

Chemins de fer de l'Etat de Finlande :

◆ F.L. **Lehtinen** (*), Directeur en Chef de la Direction Générale. (Member of the Permanent Commission.)
◆ V.J. **Tervo,** Directeur du Service de l'Exploitation.
◆ E.I. **Polvinen,** Ingénieur de la Voie, Chef de Division.
◆ E.E. **Lamminpää,** Ingénieur du Matériel.
◆ A.K. **Peitsara,** Ingénieur en Chef, Chef de Bureau.
◆ A. **Blassar,** Inspecteur de l'Exploitation.

France et Union Française
(France and French Union).

a) FRANCE MÉTROPOLITAINE.

Société Nationale des Chemins de fer français :

R. **Claudon** (*), Vice-Président du Conseil d'administration. (Member of the Permanent Commission.)
◆ L. **Armand** (*), Directeur Général .(Member of the Permanent Commission.)
Ch. **Boyaux** (*), Directeur Général adjoint. (Member of the Permanent Commission.)
◆ A. **Porchez** (*), Directeur Général Adjoint. (Member of the Permanent Commission.)
◆ J.M. **Goursat** (*), Directeur de la Région du Nord. (Vice-President of the Permanent Commission.)
◆ Ph. **Dargeou** (*), Directeur du Mouvement. (Member of the Permanent Commission.)
◆ F. **Lévi** (*), Directeur des Installations Fixes .(Member of the Permanent Commission.)
◆ R. **Dugas** (*), Directeur des Etudes Générales (Reporter).
◆ Ch. **Feyrabend** (*), Chef de la Division de l'Entretien de la Région du Sud-Est (Reporter).
◆ P. **Marois,** Directeur Commercial.
◆ A. **Parmantier,** Directeur du Matériel et de la Traction.
◆ Ch. **Bourrie,** Directeur du Personnel.
◆ A. **Ducluzeau,** Chef du Service du Matériel et de la Traction de la Région du Nord.
◆ L. **Queron,** Chef du Service de la Voie et des Bâtiments de la Région du Sud-Ouest.
◆ R. **Vaubourdolle,** Chef Adjoint des Installations Fixes.
◆ C. **Martin,** Chef du Service du Matériel et de la Traction de la Région du Sud-Est.
◆ G. **Chan,** Chef de la Division des Etudes du Matériel à la Direction du Matériel et de la Traction.
◆ R. **Guibert,** Chef de la Division de la Coordination à la Direction Commerciale.
◆ M. **Garreau,** Chef de la Division des Etudes de Traction électrique à la Direction du Matériel et de la Traction.
◆ M. **Marchand,** Chef de la Division de la Réglementation et de la Sécurité à la Direction du Mouvement.
◆ J. **Walter,** Chef de la Division des Installations de Sécurité, de Télécommunications et de Caténaires à la Direction des Installations Fixes.
◆ A. **André,** Chef de la Division de l'Administration du Personnel à la Direction du Personnel.

◆ Ch. **Peirani,** Chef de la Division des Bâtiments à la Direction des Installations Fixes.
◆ F. **Nouvion,** Ingénieur en Chef, Division des Etudes de Traction électrique à la Direction du Matériel et de la Traction.
◆ J. **Tougne,** Chef de la Subdivision de la Documentation aux Etudes Générales.
◆ P.J.J. **Riboud,** Directeur Honoraire de la Compagnie des Chemins de fer de l'Est, Président du Comité de Rédaction de la *Revue Générale des Chemins de fer.*
◆ R. **Houlez,** Chef de la Division de la Comptabilité Générale à la Comptabilité Générale et aux Finances.
◆ J. **Unal** (*), Ingénieur, Chef de la Subdivision de l'Entretien de la Région de la Méditerranée. (Section Secretary.)
◆ R. **Hommerin** (*), Inspecteur de première classe au Service du Matériel et de la Traction de la Région du Sud-Ouest (PC de Limoges). (Section Secretary.)
◆ F. **Romann** (*), Inspecteur Divisionnaire à la Direction des Installations Fixes (Division des Installations de Sécurité). (Section Secretary.)
◆ M. **Gaveau** (*), Agent d'Etudes Administratives, Adjoint au Représentant Général de la S.N.C.F. à Londres. (Section Secretary.)
◆ B. **Broca** (*), Chef de Section Principal à la S.N.C.F. (Section Secretary).

Chemins de fer Départementaux :

◆ P.M.F. **Zens,** Directeur.

Société générale des Chemins de fer économiques :

◆ M. **Poncet,** Administrateur.
◆ I. **Brochu,** Administrateur.
◆ J. **Grignon,** Directeur Général.
◆ G. **Guicheteau,** Sous-Directeur.
◆ L. **Ripert** (*), Ingénieur en Chef, Chef du Service de la Voie et des Travaux (Reporter).

Chemins de fer Economique du Nord :

◆ R. **Masson,** Ingénieur en Chef.

Régie autonome des Transports parisiens :

◆ M. **Langevin,** Directeur du Réseau ferré de la Régie.

Chemins de fer secondaires du Nord-Est :

◆ P. **Mariolle,** Directeur Général.

Compagnie Générale de Voies ferrées d'intérêt local :

◆ E. **Degardin,** Président.
◆ E. **Ytasse,** Directeur Général.

b) AUTRES TERRITOIRES DE L'UNION FRANÇAISE.

OTHER TERRITORIES OF THE FRENCH UNION).

Afrique (Africa).

Chemin de fer de Gafsa :

◆ Y. **Segretain,** Directeur Adjoint du Chemin de fer Fax-Gafsa.

Compagnie Fermière des Chemins de fer tunisiens :

◆ A. **Barbaut,** Directeur.
◆ Y. **Houdiard,** Secrétaire Général.
◆ J. **Masseron,** Ingénieur en Chef.
◆ J. **Brugère,** Administrateur, ancien Secrétaire Général.

Chemins de fer de la Méditerrannée au Niger :

P. **Depret,** Directeur Général.
◆ H. **Quetand,** Inspecteur principal de la Main-d'œuvre des Transports au Ministère des Travaux publics. Secrétaire du Conseil de Réseau.

Chemins de fer de l'Afrique Equatoriale française et du Cameroun :

◆ J. **Pialoux,** Ingénieur en Chef des Ponts et Chaussées, Ingénieur en Chef des T.P. de la F.O.M., Directeur de la Régie des Chemins de fer du Cameroun.
◆ R. **Devouge,** Ingénieur des Ponts et Chaussées, Ingénieur en Chef des T.P. de la F.O.M., Directeur du Réseau de l'A.E.F.
◆ R. **Reydellet,** Ingénieur en Chef des T.P. de la F.O.M., Chef du Service des Transports de la Direction des Travaux Publics.

Chemins de fer de l'Afrique Occidentale française et du Togo :

◆ F. **Surleau,** Conseiller d'Etat, Président du Conseil d'Administration de l'Office Central des Chemins de fer de la F.O.M. (France d'Outre-Mer).
◆ E. **Crouzet,** Ingénieur en Chef des Ponts et Chaussées, Ingénieur Général des T.P. de la F.O.M. Inspecteur Général des Travaux Publics au Ministère de la France d'Outre-Mer.
◆ P. **Jacquinot,** Ingénieur en Chef H.C. des Ponts et Chaussées, Ingénieur Général des Travaux Publics de la France d'Outre-Mer — Ministère de la France d'Outre-Mer.
◆ H. **Cunéo,** Ingénieur en Chef H.C. des Ponts et Chaussées, Ingénieur Général des T.P. de la F.O.M., Directeur Adjoint de l'Office Central des Chemins de fer de la France d'Outre-Mer.

A. **Nicolas,** Ingénieur des Ponts et Chaussées, Ingénieur en Chef des T.P. de la F.O.M., Directeur fédéral adjoint de la Régie des Chemins de fer de l'A.O.F.
◆ A. **Renouf.** Ingénieur en Chef des T.P. de la F.O.M., Chef des Services Techniques de l'Office Central des Chemins de fer de la F.O.M.
◆ B. **Petit,** Ingénieur en Chef des Chemins de fer de la F.O.M., Directeur de la Région Abidjan-Niger (A.O.F.).

P. **Protat,** Ingénieur des Ponts et Chaussées, Ingénieur Principal des Chemins de fer de la F.O.M., Directeur de la Région Conakry-Niger (A.O.F.).

Chemins de fer du Maroc :

◆ J. **Caron,** Directeur de l'Exploitation.

Chemins de fer de Madagascar :

◆ J. Ph. **Bosc,** Ingénieur en Chef H.C. des Ponts et Chaussées, Ingénieur Général des T.P. de la F.O.M., Directeur Général de l'Office Central des Chemins de fer de la France d'Outre-Mer.
◆ R. **Malacam,** Ingénieur en Chef des T.P. de la F.O.M. Directeur de la Régie des Chemins de fer de Madagascar.

Chemin de fer Franco-Ethiopien de Djibouti à Abdis-Abeba :

◆ M. **Rousset,** Directeur Général.
◆ G. **Meunier,** Directeur de l'Exploitation.

Asie (Asia)

Etat du Viêt-Nam.

Régie des Chemins de fer non concédés du Viêt-Nam :

◆ **Le-Quang-Huy** (*), Ministre des Travaux Publics et des Communications, Président du Conseil d'administration de la Régie (Gouvernement du Viêt-Nam).
◆ **Luu Van Phong,** Directeur des Bureaux du Ministère des Travaux Publics et des Communications.
◆ **Nguyen-Quang-Dat,** Inspecteur Divisionnaire.
◆ **Phan Cuong Tine,** Attaché écono-légal du Viêt-Nam à Londres.

THE COMMONWEALTH.

a) Royaume-Uni de Grande-Bretagne et Nord de l'Irlande et Territoires d'Outre-Mer en dépendant.

a) The United Kingdom of Great Britain and Northern Ireland and dependent overseas territories.

British Railways :

◆ The Rt. Hon. Lord **Hurcomb** (*), G.C.B., K.B.E., Chairman, British Transport Commission 1947-53. (Member of the Permanent Commission, Member of the British Organising Commission.)
◆ General Sir Brian H. **Robertson** (*), Bart., G.C.B., G.B.E., K.C.M.G., K.C.V.O., D.S.O., M.C., Chairman, British Transport Commission. *(President of the XVIth Session and member of the Permanent Commission.)*
◆ Sir John **Benstead** (*), C.B.E., Deputy Chairman of the British Transport Commission. *(Vice-President of the VXIth Session and member of the Permanent Commission.)*
◆ David **Blee** (*), Chief of Commercial Services, British Transport Commission. (Member of the Permanent Commission, Member of the British Organising Commission.)
◆ K.W.C. **Grand** (*), Chief Regional Manager, Western Region, British Railways. (Member of the Permanent Commission, Member of the British Organising Commission.)
◆ J.C.L. **Train** (*), C.B.E., M.C., Member, British Transport Commission. (Member of the Permanent Commission, Member of the British Organising Commission.)
◆ W.P. **Allen,** C.B.E., Chief of Establishment and Staff, British Transport Commission.
◆ E.W. **Arkle,** Commercial Superintendent, London Midland Region, British Railways.
◆ C.K. **Bird,** Chief Regional Manager, Eastern Region, British Railways.
T.F. **Cameron,** Chief Regional Manager, Scottish Region, British Railways.
◆ R.F. **Harvey,** M.B.E., Chief Officer (Motive Power) British Railways.
◆ M.S. **Hatchell,** Mechanical and Electrical Engineer, Scottish Region, British Railways.
◆ T.R. **Hawkes,** Accountant, Eastern and North Eastern Regions, British Railways.
◆ C.P. **Hopkins,** Chief Regional Manager, Southern Region, British Railways.
◆ C.C. **Inglis,** Chief Research Officer, British Transport Commission.
◆ G. **Matthews,** C.V.O., C.B.E. Operating Superintendent, Western Region, British Railways.
◆ C.S. **McLeod,** Staff Officer, Eastern Region, British Railways.
◆ L.H.K. **Neil,** Continental Traffic Manager, Eastern and North Eastern Regions, British Railways.
◆ C.E.R. **Sherrington,** O.B.E., M.C., Director, Research Information Division, British Transport Commission.
◆ H.A. **Short,** C.B.E., M.C., Chief Regional Manager, North Eastern Region, British Railways.
◆ R.E. **Sinfield,** Continental Superintendent, Southern Region, British Railways.
◆ H.H. **Swift,** Mechanical and Electrical Engineer, Southern Region, British Railways.
◆ J.W. **Watkins,** C.V.O., D.S.O., M.C., Chief Regional Manager, London Midland Region, British Railways.
◆ A.F. **Wigram,** Signal and Telecommunications Engineer, North Eastern Region, British Railways.
◆ E.A.W. **Dickson,** Auditor, Treasurer Assistant to Chief Financial Officer, British Railways.
◆ J.L. **Harrington** (*), Chief Officer (Marine and Administration), British Railways. (Member of the British Organizing Commission Chairman of the Arrangements Committee.)
◆ C.E. **Whitworth** (*), Assistant to Chief Officer (Administration), British Transport Commission. (General Secretary of the British Organising Commission.)
◆ Dr. F.F.C. **Curtis** (*), Architect, British Railways (Reporter).
◆ S.B. **Warder** (*), Chief Officer (Electrical Engineering). British Railways (Reporter).
◆ S.G. **Hearn** (*), O.B.E., Operating Superintendent, London Midland Region, British Railways (Reporter).
◆ J.H. **Fraser** (*), O.B.E. Chief Officer Engineering (Signal and Telecommunications), British Railways. (Committee of Honour British Organising Commission and Reporter.)
◆ J.H. **Glendinning** (*), District Engineer, Eastern Region, British Railways. (Section Secretary.)
◆ A.E. **Beresford** (*), Mechanical and Electrical Engineer's Department, Eastern Region, British Railways. (Section Secretary.)
◆ E.G. **Brentnall** (*), Assistant Signal and Telecommunications Engineer, London Midland Region, British Railways. (Section Secretary.)
◆ P.I. **Punt** (*), British Railways. (Section Secretary.)

London Transport Executive :

◆ Sir John **Elliot** (*), Chairman. (Member of the Permanent Commission, Member of the British Organising Commission.)
◆ J. **Cliff** (*), Deputy Chairman. (Member of the Permanent Commission, Member of the British Organising Commission.)
◆ A.H. **Grainger** (*), Member. (Member of the British Organizing Commission.)
◆ A.B.B. **Valentine** (*), Member. (Member of the British Organizing Commission.)
◆ A.W. **Manser,** Chief Mechanical Engineer (Railways).
◆ F.G. **Maxwell,** T.D. Operating Manager (Railways).
◆ T.S. **Pick** (*), Chief Electrical Engineer (Reporter).
◆ R.M. **Robbins** (*), Secretary. (Member of the British Organizing Commission.)
◆ R.E.F. **Oggier** (*), Executive Assistant, Development and Research Office, London Transport Executive. (Section Secretary.)

East African Railways and Harbours :

◆ A.F. **Kirby,** General Manager.
◆ W. **Urquhart,** Chief Engineer.
◆ J.A. **Addington,** Assistant Chief Operating Superintendent.
◆ R.H. **Leadbeater,** District Engineer.
◆ R.M.L. **Lemon,** Chief Establishment Officer.
◆ H.M. **Gordon,** District Traffic Superintendent.
◆ Lloyd **Jones,** Assistant Traffic Superintendent.
◆ F.J. **Kent,** Assistant Mechanical Engineer.

Nigerian Railway :

◆ S. **David,** Ag. Chief Superintendent.
◆ J.R.J. **Pett,** Carriage and Wagon Superintendent.
◆ C.M. **Field,** District Engineer.
◆ H.F.Ph. **Plumridge,** Assistant General Manager (Staff).

Malayan Railway :

◆ R.O.J. **Coppage,** Administrative Officer (Personnel).
◆ E.F. **Draper,** Engineer, Way and Works.

b) **Nouvelle-Zélande (New Zealand).**

New Zealand Government Railways :

◆ R.F. **Marriott,** Advisory Engineer.
◆ G.S.J. **Read,** Inspecting and Test Engineer.

c) **Union Sud-Africaine (Union of South Africa).**

South African Railways and Harbours :

◆ D.H.C. **Du Plessis,** General Manager.
◆ C.T. **Long** (*), Assistant Chief Mechanical Engineer (Motive Power) (Reporter).
◆ W.H.W. **Maass** (*), Advisory Engineer .(Member of the Permanent Commission.)
◆ J.R. **Naisby,** Commercial Representative in London.
◆ M.J. **Oelofsen,** Secretary to the General Manager.

d) **Inde (India).**

Indian Government Railways (Railway Board of India) :

◆ F.Ch. **Badhwar** (*), Chairman, Railway Board (Member of the Permanent Commission).
◆ V. **Vankataramayya** (*), Deputy Chief Controller of Standardisation (Reporter).
◆ R.H.G. **da Cunha da Costa,** Railway Adviser to the High Commissioner for India in Great Britain.
◆ K.C. **Sood,** Inspecting Officer.
◆ N. **Padmanabhan,** Inspecting Officer.

c) **Ceylan (Ceylon).**

Ceylon Government Railway :

◆ M.M. **Greve,** Divisional Transportation Superintendent.

Grèce (Greece).

Chemins de fer de l'Etat hellénique :

◆ C. **Melissinos,** Directeur Général.
◆ C. **Economides,** Directeur de la Direction Régionale à Thessaloniki.
C. **Pantazis,** Vice-Président du Conseil d'Administration.
◆ S. **Zographakis,** Conseiller Administratif.

Chemin de fer Pirée-Athènes-Péloponèse :

◆ G. **Papalexandrou,** Directeur Général.
K. **Stamelos,** Directeur de l'Exploitation.
◆ D. **Efstratiadis,** Directeur de la Voie et des Travaux.

Iran.

Chemins de fer d'Etat Iraniens :

◆ Ing. K. **Hédayat,** Conseiller et Envoyé Spécial pour l'Europe des Chemins de fer d'Etat Iraniens.

République d'Irlande. (Republic of Ireland).

Coras Iompair Eireann :

◆ T.C. **Courtney** (*), Chairman. (Member of the Permanent Commission.)
◆ F. **Lemass** (*), General Manager (Reporter).
◆ O.V.S. **Bulleid,** Chief Mechanical Engineer.
◆ L. **Collins,** Assistant Chief Mechanical Engineer.
◆ D. **Herlihy,** Chief Engineer.
◆ D. **Stewart,** Traffic Manager.
◆ H.J. **Guthrie,** Signalling and Electrical Engineer.
◆ M.J. **Hayes,** Staff Relations Officer.

Italie (Italy).

Chemins de fer de l'Etat italien :

Dr. Ing. G. **di Raimondo** (*), Directeur Général. (Member of the Permanent Commission.)
◆ Dr. Ing. F. **Marin** (*), Vice-Directeur Général. (Member of the Permanent Commission.)
◆ Dr. N. **Laloni** (*), Directeur Général Adjoint. (Member of the Permanent Commission.)
◆ Dr. Ing. F. **Fazio** (*), Conseiller d'Administration (Member of the Permanent Commission).
◆ Dr. Ing. G. **Lasz** (*), Conseiller d'Administration. (Member of the Permanent Commission.)
◆ Dr. Ing. A. **Cuttica** (*), Chef du Service du Matériel et de la Traction. (Member of the Permanent Commission.)
◆ Dr. Ing. F. **Donati,** Chef du Service des Installations Electriques.
◆ Dr. Ing. A. **Florena,** Chef du Service du Personnel et des Affaires Générales.
◆ Dr. Ing. M. **Valdivieso,** Inspecteur en Chef Supérieur au Service du Personnel et des Affaires Générales.
◆ Dr. Ing. G. **Musso,** Inspecteur en Chef Supérieur au Service des Installations Electriques.
◆ Dr. Ing. F. **Tolotti,** Inspecteur en Chef Supérieur au Service des Installations Electriques.
◆ Dr. Ing. A. **D'Arbela,** Inspecteur en Chef Supérieur au Service de la Traction.
◆ Dr. Ing. T. **Zattoni,** Inspecteur en Chef au Service de la Traction.
◆ Dr. Ing. B. **Renda,** Chef du Service de la Voie.
◆ Dr. Ing. E. **Palladini,** Inspecteur en Chef au Service de la Voie.
◆ Dr. Ing. G. **Caliendo,** Chef du Service des Finances.
◆ Dr. D. **Cecchi,** Inspecteur en Chef Supérieur au Service des Finances.
◆ Dr. Ing. M. **Cirillo,** Chef de Service au Service du Mouvement.
◆ Dr. G. **Santoni Rugiu,** Inspecteur en Chef Supérieur au Service Commercial.

◆ Dott. A. **di Lullo,** Chef du Service Médical.
◆ Dr. Ing. M. **Diegoli,** Inspecteur en Chef Supérieur au Service du Matériel et de la Traction (Reporter).
◆ Dr. G. **Renzetti,** Inspecteur en Chef Supérieur, Chef de la Section Commerciale.

Chemins de fer de la Méditerranée :

◆ Dr. Ing. E. **Denti,** Vice-Président.
Ing. G. **Radici,** Conseiller Délégué.
◆ Ing. M. **Sirignano,** Directeur de l'Exploitation du Chemin de fer Centrale Umbra.

Chemin de fer du Nord de Milan :

Dr. C. **Bobbio,** Président du Conseil d'Administration.
◆ Ing. G. **Bianchi,** Administrateur. Délégué, Directeur Général.

Società Nazionale di Ferrovie e Tranvie :

Avv. L. **Ottone,** Administrateur-Délégué.

S.A. Torinese Tranvie intercomunali :

◆ F. **Giupponi,** Directeur Général.

Società Tranvie Elettriche Bresciane :

Dr. Ing. A. **Bauer,** Administrateur-Délégué et Directeur Général.

Société Vénitienne pour la construction et l'exploitation de Chemins de fer secondaires en Italie :

Dr. M. **Fabro,** Président.
Ing. G. **Fattori,** Directeur.

Compagnie du Chemin de fer Danublo-Sava-Adriatico :

◆ Dr. A. **Weissel,** Directeur Général Adjoint.

Luxembourg (Luxemburg).

Société Nationale des Chemins de fer luxembourgeois :

◆ J.P. **Musquar,** Directeur Général.
◆ J. **Metzdorff,** Président du Conseil d'Administration.
◆ A. **Theato,** Ingénieur en Chef.

Norvège (Norway).

Chemins de fer de l'Etat norvégien :

◆ H.E. **Stokke** (*), Directeur Général. (Member of the Permanent Commission.)
◆ O. **Holtmon,** Directeur en Chef.
◆ L. **Tveten,** Directeur du Service Administratif.
◆ G. **Kavli,** Directeur du Service des Installations Fixes.
◆ L. **Saxegaard,** Ingénieur en Chef.
◆ J. **Johnsen,** Directeur de Région.
◆ R. **Sörvik** (*), Ingénieur Principal (Reporter).
◆ S. **Rounge,** Trésorier à l'Association des Cheminots norvégiens (Norsk Jernbane Forbund).

Pays-Bas (Netherlands).

S.A. des Chemins de fer Néerlandais :

◆ Ing. F.Q. **den Hollander** (*), Président de la Direction Générale. (Member of the Permanent Commission.)
◆ Dr. D.J. **Wansink,** Directeur Général.
◆ J. **Lohmann,** Chef du Service de la Voie et des Travaux.
◆ J.F. **Deenik,** Ingénieur en Chef au Service de la Voie et des Travaux.
◆ J.P. **Koster,** Chef du Service du Matériel et des Ateliers.
◆ H.A.E. **de Vos tot Nederveen Cappel,** Chef de la Signalisation.
◆ V.J.M. **De Blieck,** Ingénieur en Chef à la Signalisation.
◆ J. **Wessels Boer,** Chef du Service de l'Exploitation.
◆ J.P.B. **Tissot van Patot** (*), Chef de Division : Cabinet et Politique Générale (Reporter).

Portugal (Portugal).

a) CONTINENT.

Compagnie des Chemins de fer Portugais :

◆ Ing. M.M. **de Oliveira Costa,** Administrateur-Délégué.
◆ Dr. M. Malheiro **Reymâo Nogueira,** Administrateur.
◆ Ing. A. Branco **Cabral,** Secrétaire Général.
◆ Ing. R. **de Espregueira Mendes,** Directeur Général.
◆ Ing. A.A.M. **de Campos Henriques,** Sous-Directeur.
◆ Ing. F. **de Arruda,** Chef de la Division du Matériel et de la Traction.
◆ Ing. C.S.B. **de Carvalho,** Sous-Chef de la Division de la Voie et des Travaux.
◆ Ing. J.J. **dos Santos,** Sous-Chef de la Division de l'Exploitation.

b) TERRITOIRES D'OUTRE-MER.
(OVERSEAS TERRITORIES).

E. **Salles Lane,** Ingénieur, Président du Conseil d'Administration de la Compagnie du Chemin de fer d'Amboim (Angola).

Compagnie du Chemin de fer du Benguela :

◆ Ing. C. **Manitto Torres,** Ingénieur.
◆ Ing. E. **Duaret Ferreira,** Président du Collège des Commissaires.
◆ Col. R.J. **Walker,** Directeur du Comité de Londres.
◆ S.G. **Watts,** Employé du Comité de Londres.

Chemin de fer du Mozambique :

◆ Ing. F.A. **Soares Seixas,** Directeur de l'Exploitation, Division Mozambique.
◆ J. Amancio **Cruz,** Adjoint Electrotechnique de la Direction Générale.

Soudan Anglo-Egyptien. (Anglo-Egyptian Sudan).

Sudan Railways :

◆ G.K. **Wood,** Chief Mechanical Engineer.
◆ Ahmed el Amin **Hummeida,** District Locomotive Superitendent.
W.J. **Greenhouse,** Maintenance Engineer.
◆ L.J. **Godfrey,** Signal and Telegraph Engineer.

Suède (Sweden).

Chemins de fer de l'Etat suédois :

◆ E.G.J. **Upmark** (*), Directeur Général en Chef. (Member of the Permanent Commission.)
A.E. **Alström,** Directeur du Service du Matériel Roulant et de la Traction.
◆ G. **Ek,** Inspecteur Principal, Chef d'Arrondissement.
◆ B.G.O. **Elwing,** Ingénieur, Chef de Région.

◆ K.G.R. **Engström,** Inspecteur Principal.
◆ O.F.R. **Jerneryd,** Ingénieur, Chef d'Arrondissement.
◆ L. **Johansson,** Inspecteur en Chef.
◆ A.L. **Karsberg,** Directeur du Service de l'Electrification.
◆ E. **Kjebon,** Directeur de la Société SLAB affiliée aux S.J.
◆ G.S. **Nyblin,** Ingénieur en Chef.
◆ J.S.E. **Schäder,** Ingénieur en Chef.
◆ E.A. **Sjöberg,** Directeur en Chef du Service des Affaires Economiques.
◆ T. **Sundberg,** Inspecteur Général d'Exploitation.
◆ P.H. **Swartling,** Ingénieur, Chef de Région.
◆ B.L. **Wijkman,** Ingénieur en Chef, Directeur adjoint du Service de l'Electrification.
◆ B.A. **Adamson** (*), Inspecteur Principal (Reporter).

Chemin de fer Normark-Klarlävens :

◆ Nils B. **Larsson,** Chief Engineer.

Oxelösund-Flen-Västmanlands Jernvägsaktiebolag :

◆ L. **Granfeldt,** Directeur-Gérant.
◆ S. **Lagergren,** Ingénieur en Chef.

Chemin de fer Stockholm-Roslag :

◆ A.A. **Rydberg,** General Manager.
◆ E. **Fredriksson,** Railway Inspector.

Suisse (Switzerland).

Chemins de fer fédéraux suisses :

◆ Dr H. **Gschwind** (*), Président de la Direction Générale. (Member of the Permanent Commission.)
◆ Ing. O. **Wichser,** Directeur Général.
◆ Dr M. **Strauss,** Secrétaire Général.
◆ W. **Tribelhorn,** Chef Principal de l'Exploitation.
◆ Ing. M. **Portmann,** Chef de la Division des Travaux.
◆ Ing. F. **Gerber,** Chef de la Division de la Traction et des Ateliers.
◆ Dr G. **Dreyer** (*), Adjoint au Secrétaire Général (Reporter).

Chemin de fer des Alpes bernoises (Berne-Loetschberg-Simplon) :

R. **Bratschi,** Directeur.
R. **Grimm,** membre du Comité de Direction.

Chemin de fer Rhétique :

P. **Buchli,** Directeur.
C. **Mohr,** Ingénieur en Chef.

Chemin de fer de Viège à Zermatt :

P. **Schneller,** Directeur.

Chemins de fer fribourgeois :

X. **Remy** (*), Directeur. (Member of the Permanent Commission.)

Syrie (Syria).

Chemin de fer de l'Etat Syrien-Lignes du Nord :

Abdel-Karim **Chamy,** Chef du Bureau Technique et Service de la Voie et des Bâtiments.
Yeretzian Kegham, Chef du Bureau des Statistiques.

Chemin de fer de Damas-Hama et Prolongements :

O. **Henry-Gréard,** Président, Directeur Général.
J. **Lancrenon,** Administrateur.
Ch. **Chenut,** Administrateur.

Yougoslavie (Yugoslavia).

Chemins de fer Yougoslaves :

◆ Ing. J. **Švagel,** Directeur de l'Institut des Chemins de fer.
◆ Dipl. Ing. M. **Selić,** Conseiller de l'Institut des Chemins de fer.
◆ Dr. Ing. D. **Viličković,** Conseiller Technique de l'Institut des Chemins de fer.
◆ Ing. F. **Jagodić,** Conseiller Technique de l'Institut des Chemins de fer.

C. — ORGANISMES (ORGANISATIONS).

Compagnie internationale des Wagons-Lits et des Grands Express européens :

◆ R. **Margot-Noblemaire,** Administrateur-Directeur Général.
◆ A. **Widhoff,** Directeur Général Adjoint.
◆ P. **Mareschal,** Directeur de l'Exploitation Générale.
◆ A. **Pillepich,** Ingénieur en Chef des Services Techniques.
◆ **Lopez-Jamar,** Directeur de la Direction de Madrid.

Deutsche Schlafwagen- und Speisewagen-Gesellschaft :

◆ F.W. **Gehrholz,** Handlungsbevollmächtigter.

Federazione Nazionale Imprese Trasporti :

◆ Dr. Ing. I. **Vanzi,** Président.

Office Central des Transports Internationaux par Chemins de fer :

◆ Dr. R. **Cottier** (*), Directeur. (Member of the Permanent Commission.)

Union Internationale des Chemins de fer :

◆ J. **Tuja** (*), Secrétaire Général de l'U.I.C. (Member of the Permanent Commission.)
◆ G. **Harrand,** Ingénieur en Chef à la S.N.C.F. détaché à l'U.I.C.
◆ P. **Rousseau,** Chef du Secrétariat de l'U.I.C.
◆ H. **Bonnefon,** Conseiller Technique Supérieur, Chef du Service Général de l'Office de Recherches et d'Essais. (O.R.E.)
◆ J. **Klaren,** Conseiller Technique Supérieur, Chef du Service Technique (Installations Fixes). (O.R.E.)
◆ W. **Reck,** Conseiller Technique Supérieur, Chef du Service Technique (Traction et Matériel). (O.R.E.)

Union des Chemins de fer privés suédois :

◆ A. **Nerell,** Président.
◆ S. **Samuelson,** Secrétaire Général.

Union des Voies ferrées :

◆ A.-J. **Petithory,** Secrétaire Général.

* * *

Invited :

◆ Ing. Atilio **Cappa,** Président de la « Asociacion del Congreso Panamericano de Ferrocarriles » (Buenos Aires).

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961	**Hédayat, K.**	Chemins de fer d'Etat iraniens	I, IV
725	**Herlihy, D.**	Coras Iompair Eireann (Ireland)	I, III, V
739	**Herschend, W.**	Chemins de fer de l'Etat danois	IV
537	**Hirzel, O.**	Office Fédéral des Transports (Suisse)	I, II, IV, V
163	**Hole, F.G.**	British Organising Commission	I
816	**Holtmon, O.**	Chemins de fer de l'Etat norvégien	IV
312	**Hommerin, R.**	Société Nationale des Chemins de fer français	II
901	**Hopkins, C.P.**	British Railways	I to V
939	**Houdiard, Y.**	Compagnie Fermière des Chemins de fer tunisiens	IV

Number.	NAME.	DELEGATED BY	SECTIONS.
360	**Houlez, R.**	Société Nationale des Chemins de fer français	...
65	**Hull, H.**	Committee of Honour. British Organising Commission	...
860	**Hummeida, Ahmed El Amin.**	Sudan Railways	II, III
164	**Hunt, E.S.**	British Organising Commission (Member of Arrangements Committee)	III, IV
5	**Hurcomb** (The Right Hon. Lord Cyril)	Permanent Commission of the Association, British Organising Commission and British Railways	I, II, IV
13	**Huyberechts, A.** (Dr.)	Commission Permanente de l'Association et Société Nationale des Chemins de fer belges	IV
902	**Inglis, C.C.**	British Railways	I, II, IV
871	**Ithier, G.**	Compagnie Générale d'Entreprises électriques et industrielles « Electrobel » (Belgique)	II, IV, V
31	**Jacobshagen, M.**	Commission Permanente de l'Association et Deutsche Bundesbahn	III
792	**Jacquinot, P.**	Chemins de fer de l'Afrique occidentale française et du Togo	II, III
996	**Jagodić, F.** (Ing.)	Chemins de fer yougoslaves	...
547	**Jaros, P.**	Ministère des Chemins de fer (Pologne)	III
6	**Jenkins** (Sir Gilmour)	Permanent Commission of the Association, Ministry of Transport and Civil Aviation and British Organising Commission	I to V
502	**Jensen, J.K.F.**	Ministère des Travaux Publics (Danemark)	I, IV
806	**Jerneryd, O.F.R.**	Chemins de fer de l'Etat suédois	I
807	**Johansson, L.**	Chemins de fer de l'Etat suédois	I
822	**Johnsen, J.**	Chemins de fer de l'Etat norvégien	II
737	**Johnsen, N.C.D.**	Chemins de fer de l'Etat danois	III, IV
841	**Jones, Lloyd**	East African Railways and Harbours	III, IV, V
528	**Julien, P.M.**	Ministère des Travaux Publics, des Transports et du Tourisme (France)	I, IV
808	**Karsberg, Å.L.**	Chemins de fer de l'Etat suédois	II, V
820	**Kavli, G.**	Chemins de fer de l'Etat norvégien	I, V
842	**Kent, F.J.**	East African Railways and Harbours	II, IV
981	**Khairy, Ahmed Hamed**	Egyptian State Railways	III, V
835	**Kirby, A.F.**	East African Railways and Harbours	I, II, III, IV
773	**Kirste, H.** (Dr.)	Deutsche Bundesbahn	IV
404	**Kitching, R.H.**	British Organising Commission (Secretariat)	...
809	**Kjebon, E.**	Chemins de fer de l'Etat suédois	IV
973	**Klaren, J.**	Union Internationale des Chemins de fer	I, II, V
863	**Koster, J.P.**	Chemins de fer Néerlandais	II
58	**Kunz, R.**	Commission Permanente de l'Association et Office Fédéral des Transports (Suisse)	I, III, IV
717	**Lagergren, S.**	Chemin de fer Oxelösund-Flen-Västmanlands (Suède)	I, II
20	**Laloni, N.** (Dr. Prof.)	Commission Permanente de l'Association et Chemins de fer de l'Etat italien	IV
8	**Lamalle, U.**	Commission Permanente de l'Association	I to V

Number.	NAME.	DELEGATED BY	SECTIONS.
165	**Lamb, D.R.**	British Organising Commission	I, II, III
915	**Lamminpää, E.E.**	Chemins de fer de l'Etat de Finlande	II, III, IV
731	**Lancrenon, J.**	Chemin de fer de Damas-Hama et Prolongements (Syrie)	II
748	**Langevin, M.**	Régie Autonome des Transports Parisiens (France)	II, IV
183	**Langley** (Brigadier Ch.A.)	British Organising Commission	II, V
883	**Larsen, J.A.**	Chemin de fer Privé d'Aalborg (Danemark)	I
872	**Larsson, N.B.**	Chemin de fer Nordmark-Klarälvens (Suède)	II, III, V
22	**Lasz, G.** (Dr.-Ing.)	Commission Permanente de l'Association et Chemins de fer de l'Etat italien	IV
838	**Leadbeater, R.H.**	East African Railways and Harbours	I, V
535	**Lebessis, A.**	Ministère des Communications (Grèce)	I, IV
48	**Lehtinen, F.L.**	Commission Permanente de l'Association et Chemins de fer de l'Etat de Finlande	I, IV, V
253	**Lemass, F.**	Coras Iompair Eireann (Ireland)	I, II, IV
839	**Lemon, R.M.L.**	East African Railways and Harbours	IV
274	**Lenfant, H.**	Secrétariat de l'Association Internationale du Congrès des Chemins de fer	IV
61	**Lennox-Boyd** (Rt. Hon. Alan T.)	Committee of Honour. British Organising Commission (Vice-President of Honour of the Session)	...
524	**Le-Quang-Huy**	Ministère des Travaux Publics et des Communications (Viêt-Nam)	I, II, V
16	**Lévi, R.**	Commission Permanente de l'Association et Société Nationale des Chemins de fer français	I, III
761	**Limet, E.**	Compagnie du Chemin de fer du Bas-Congo au Katanga (Congo Belge)	I, II
186	**Lintern, R.**	British Organising Commission	...
862	**Lohmann, J.**	Chemins de fer Néerlandais	I
254	**Long, C.T.**	South African Railways and Harbours	II
992	**Lopez-Jamar**	Compagnie Internationale des Wagons-Lits et des Grands Express européens	...
720	**Luu Van Phong**	Régie des Chemins de fer non concédés du Viêt-Nam	III, IV
53	**Maass, W.H.W.**	Permanent Commission of the Association and South African Railways and Harbours	II, V
919	**Macias, M.**	Réseau National des Chemins de fer espagnols	IV
904	**McLeod, C.S.**	British Railways	IV
515	**McMullen** (Colonel D.)	Ministry of Transport and Civil Aviation (Great Britain)	III
509	**Maguire, A.J.**	British Government	II, V
789	**Malacam, R.**	Chemins de fer de Madagascar	I, V
12	**Malderez, M.**	Commission Permanente de l'Association et Ministère des Communications (Belgique)	I, III, IV
920	**Maldonado, M.**	Réseau National des Chemins de fer espagnols	II, IV
867	**Manitto Torres, C.**	Companhia do Caminho de Ferro de Benguela	III, IV, V

Number.	NAME.	DELEGATED BY	SECTIONS.
912	**Manser, A.W.**	London Transport Executive	II, V
275	**Marchal, A.**	Société Nationale des Chemins de fer belges	III
853	**Marchand, M.**	Société Nationale des Chemins de fer français	III
950	**Mareschal, P.**	Compagnie Internationale des Wagons-Lits et des Grands Express européens	III, IV
948	**Margot-Noblemaire, R.**	Compagnie Internationale des Wagons-Lits et des Grands Express européens	III, IV
56	**Marin, F. (Dr. Ing.)**	Commission Permanente de l'Association et Chemins de fer de l'Etat italien	I, II, III
729	**Mariolle, P.**	Compagnie des Chemins de fer Secondaires du Nord-Est (France)	II, IV, V
843	**Marois, P.**	Société Nationale des Chemins de fer français	IV
882	**Marriott, R.F.**	New Zealand Government Railways	II, IV, V
849	**Martin, C.**	Société Nationale des Chemins de fer français	II, IV
999	**Martinez, J.**	Chemins de fer de l'Etat Argentin	II
940	**Masseron, J.**	Compagnie Fermière des Chemins de fer tunisiens	I, V
1050	**Masson, R.**	Chemins de fer Economiques du Nord (France)	...
903	**Matthews, G.**	British Railways	III, IV
518	**Maunder, W.R.**	Ministry of Transport and Civil Aviation (Great Britain)	I, V
911	**Maxwell, F.G.**	London Transport Executive	III
953	**Melissinos, C.**	Chemins de fer de l'Etat hellénique	II
975	**Metzdorff, J.**	Société Nationale des Chemins de fer luxembourgeois	IV
780	**Meunier, G.**	Compagnie du Chemin de fer Franco-Ethiopien de Djibouti à Addis-Abeba	I, IV, V
538	**Meyer, H.R.**	Office Fédéral des Transports (Suisse)	III, IV
74	**Mishcon, V.**	Committee of Honour, British Organising Commission	...
709	**Mohr, C.**	Chemin de fer Rhétique (Suisse)	I, III, IV, V
62	**Molson, A.H.E.**	Committee of Honour, British Organising Commission	...
823	**Mölter, Th. (Dr.)**	Deutsche Bundesbahn	IV
918	**Moreno, A.**	Réseau National des Chemins de fer espagnols	I, II, IV
520	**Morgan, A.M.**	British Government	IV
831	**Moulart, G.**	Société Nationale des Chemins de fer belges	I, III, IV
705	**Musquar, J.-P.**	Société Nationale des Chemins de fer luxembourgeois	II, IV
927	**Musso, G. (Dr. Ing.)**	Chemins de fer de l'Etat italien	II, V
743	**Naisby, J.R.**	South African Railways and Harbours	IV
905	**Neil, L.H.K.**	British Railways	IV
876	**Nerell, A.**	Union des Chemins de fer Privés suédois	IV
719	**Nguyen-Quang-Dat**	Régie des Chemins de fer non concédés du Viêt-Nam	III, IV
280	**Noguès, J.**	Réseau National des Chemins de fer espagnols	III, IV

Number.	NAME.	DELEGATED BY	SECTIONS.
37	**Nolet de Brauwere, P.**	Commission Permanente de l'Association et Société Nationale des Chemins de fer belges	IV
857	**Nouvion, F.**	Société Nationale des Chemins de fer français	II
810	**Nyblin, G.S.**	Chemins de fer de l'Etat suédois	II, V
744	**Oelofsen, M.J.**	South African Railways and Harbours	III, IV, V
309	**Oggier, R.E.F.**	London Transport Executive	V
33	**Olivier, G.**	Commission Permanente de l'Association et Société Nationale des Chemins de fer belges	II, III, V
180	**O'Neill, D.**	British Organising Commission	I, IV
960	**Padmanabhan, N.**	Indian Government Railways (Railway Board, India)	II, V
511	**Page, S.J.**	Ministry of Transport and Civil Aviation (Great Britain)	I, IV
932	**Palladini, E. (Dr. Ing.)**	Chemins de fer de l'Etat italien	I, V
782	**Papalexandrou, G.**	Chemin de fer Pirée-Athènes-Péloponèse (Grèce)	I, IV
167	**Parkhouse, S.E.**	British Organising Commission (Member of Arrangements Committee)	II, III
844	**Parmantier, A.**	Société Nationale des Chemins de fer français	II
856	**Peirani, Ch.**	Société Nationale des Chemins de fer français	I
916	**Peitsara, A.K.**	Chemins de fer de l'Etat de Finlande	I, V
886	**Peñarroja Esbri, A.**	Compañia General de Ferrocarriles Catalanes (Espagne)	I, III, IV, V
25	**Perrone, V. (Dr. Ing.)**	Commission Permanente de l'Association et Ministère des Transports (Italie)	II, IV, V
504	**Pescatore, G.**	Ministère des Transports (Italie)	IV
796	**Petit, B.**	Chemins de fer de l'Afrique occidentale française et du Togo	II, IV
766	**Petithory, A.-J.**	Union des Voies Ferrées (France)	V
879	**Pett, J.R.J.**	Nigerian Railway	II, V
1000	**Phan Cuong Tine**	Régie des Chemins de fer non concédés du Viêt-Nam	...
798	**Pialoux, J.**	Chemins de fer de l'Afrique équatoriale française et du Cameroun	II, IV
257	**Pick, T.S.**	London Transport Executive	II, III, V
951	**Pillepich, A.**	Compagnie Internationale des Wagons-Lits et des Grands Express européens	III, IV
771	**Pischel, W. (Dr.)**	Deutsche Bundesbahn	IV
402	**Pluck, F.C.**	British Organising Commission (Secretariat)	...
881	**Plumridge, H.F.Ph.**	Nigerian Railway	IV
914	**Polvinen, E.I.**	Chemins de fer de l'Etat de Finlande	III, V
767	**Poncet, M.**	Société Générale des Chemins de fer Economiques (France)	IV, V
168	**Pope, F.A.**	Commission Britannique d'Organisation	IV

Number.	NAME.	DELEGATED BY	SECTIONS.
44	**Porchez, A.**	Commission Permanente de l'Association et Société Nationale des Chemins de fer français	I, III
752	**Portmann, M.**	Chemins de fer fédéraux suisses	I
270	**Pratesi, L.** (Ing.)	Ministère des Transports (Italie)	II
179	**Proctor, P.D.**	British Organising Commission	...
529	**Prot, M.**	Ministère des Travaux Publics, des Transports et du Tourisme (France)	II, III
307	**Punt, P.I.**	British Railways	IV
847	**Queron, L.**	Société Nationale des Chemins de fer français	I
734	**Quetand, H.**	Chemins de fer de la Méditerranée au Niger	III, IV
169	**Ratter, J.**	British Organising Commission (Member of Arrangements Committee)	I
991	**Read, G.S.J.**	New Zealand Government Railways	II, IV
974	**Reck, W.**	Union Internationale des Chemins de fer	II, V
516	**Reed** (Colonel W.P.)	Ministry of Transport and Civil Aviation (Great Britain)	I, V
7	**Remy, X.**	Commission Permanente de l'Association et Chemins de fer fribourgeois (Suisse)	IV, V
723	**Renard, L.**	Railways Economiques de Liège-Seraing et Extensions (Belgique)	V
931	**Renda, B.** (Dr. Ing.)	Chemins de fer de l'Etat italien	I, III
884	**Rendbeck, G.Ch.**	Chemin de fer privé d'Aalborg (Danemark)	I
795	**Renouf, A.**	Chemins de fer de l'Afrique occidentale française et du Togo	I, II
282	**Renzetti, G.** (Dr.)	Chemins de fer de l'Etat italien	IV
801	**Reydellet, R.**	Chemins de fer de l'Afrique équatoriale française et du Cameroun	I, III
963	**Reymao Nogueira, M.M.** (Dr.)	Compagnie des Chemins de fer portugais	II, IV
987	**Riboud, P.J.J.**	Société Nationale des Chemins de fer français	I, III, IV
764	**Richelot, Ch.**	Office d'Exploitation des Transports Coloniaux « OTRACO » (Belgique)	I, V
259	**Ripert, L.**	Société Générale des Chemins de fer Economiques (France)	I, III, V
57	**Rizk, Ahmed Mohamed**	Commission Permanente de l'Association et Ministère des Communications (Egypte)	II, III, IV
178	**Robbins, R.M.**	British Organising Commission and London Transport Executive (Member of Arrangements Committee)	IV
3	**Robertson** (General Sir Brian H.)	Permanent Commission of the Association and Committee of Honour British Organising Commission, *President of the XVIth Session*	IV
313	**Romann, F.**	Société Nationale des Chemins de fer français	III
891	**Rounge, S.**	Chemins de fer de l'Etat norvégien	IV
825	**Rousseau, P.**	Union Internationale des Chemins de fer	I, IV, V
779	**Rousset, M.**	Compagnie du Chemin de fer Franco-Ethiopien de Djibouti à Addis-Abeba	II, III, IV

Number.	NAME.	DELEGATED BY	SECTIONS.
69	**Russell** (The Rt. Worshipful Charles P.)	Committee of Honour British Organising Commission	...
985	**Rydberg, A.Å.**	Chemin de fer Stockholm-Roslag (Suède)	I, V
982	**Salah-El-Dine, Abdul Hadi**	Egyptian State Railways	III, V
530	**Salles Lane, E.**	Gouvernement portugais	III, IV, V
877	**Samuelson, S.**	Union des Chemins de fer privés suédois	IV
935	**Santoni Rugiu, G.** (Dr.)	Chemins de fer de l'Etat italien	IV
821	**Saxegaard, L.**	Chemins de fer de l'Etat norvégien	II, III, V
811	**Schäder, J.S.E.**	Chemins de fer de l'Etat suédois	I, V
36	**Schantl, M.** (Dr.)	Commission Permanente de l'Association et Chemins de fer fédéraux autrichiens	IV
261	**Schmitz, W.** (Prof. Dr.-Ing.)	Deutsche Bundesbahn	III
943	**Schneller, P.**	Chemin de fer de Viège à Zermatt (Suisse)	I, IV, V
262	**Schramm, G.** (Dr.-Ing. habil.)	Deutsche Bundesbahn	I
988	**Segretain, Y.**	Chemin de fer de Gafsa (Tunisie)	III, IV, V
998	**Selić, M.** (Dipl. Ing.)	Chemins de fer yougoslaves	I
70	**Shepherd-Barron, W.P.**	Committee of Honour British Organising Commission	I
990	**Sherrington, C.E.R.**	British Railways	I, IV
906	**Short, H.A.**	British Railways	III, IV
921	**Silvela, M.**	Réseau National des Chemins de fer espagnols	III, IV
907	**Sinfield, R.E.**	British Railways	IV
777	**Singelmann, W.**	Deutsche Bundesbahn	IV
712	**Sirignano, M.** (Dr.-Ing.)	Società Italiana per le Strade Ferrate del Mediterraneo (Italie)	I, II, V
812	**Sjöberg, E.A.**	Chemins de fer de l'Etat suédois	I, IV
543	**Slim, J.**	Ministère des Transports et du Waterstaat (Pays-Bas)	I, III, V
73	**Smith, M.G.R.**	Committee of Honour British Organising Commission	I
170	**Smyrk, R.A.**	British Organising Committee (Member of Arrangements Committee)	IV
993	**Soares Seixas, F.A.**	Chemin de fer du Mozambique	I, II, V
959	**Sood, K.C.**	Indian Government Railways (Railway Board, India)	I, IV
264	**Sörvik, R.**	Chemins de fer de l'Etat norvégien	III
266	**Squilbin, R.**	Société Nationale des Chemins de fer belges	II
510	**Stedman, G.F.**	Ministry of Transport and Civil Aviation (Great Britain)	IV
747	**Sterba, J.**	Chemins de fer fédéraux autrichiens	IV
185	**Stewart, A.**	British Organising Committee (Secretariat)	...
726	**Stewart, D.**	Coras Iompair Eireann (Ireland)	III, IV
19	**Stokke, H.E.**	Commission Permanente de l'Association et Ministère des Travaux Publics (Norvège)	I to V
750	**Strauss, M.** (Dr.)	Chemins de fer fédéraux suisses	IV
813	**Sundberg, T.**	Chemins de fer de l'Etat suédois	III, IV
790	**Surleau, F.**	Chemins de fer de l'Afrique occidentale française et du Togo	I, IV
997	**Svagel, J.** (Ing.)	Chemins de fer yougoslaves	II, III

Number.	NAME.	DELEGATED BY.	SECTIONS.
814	**Swartling, P.H.**	Chemins de fer de l'Etat suédois	I, IV
908	**Swift, H.H.**	British Railways	II, V
519	**Taylor, L.J.**	British Government	I
40	**Terkelsen, E.D.**	Commission Permanente de l'Association et Ministère des Travaux Publics (Danemark)	IV
913	**Tervo, V.J.**	Chemins de fer de l'Etat de Finlande	III, IV
706	**Theato, A.**	Société Nationale des Chemins de fer luxembourgeois	I, III
745	**Tiemroth, H.**	Chemin de fer de Lolland-Falster (Danemark)	IV
271	**Tissot van Patot, J.P.B.** (Dr.)	Chemins de fer Néerlandais	IV
928	**Tolotti, F.** (Dr. Ing.)	Chemins de fer de l'Etat italien	III
858	**Tougne, J.**	Société Nationale des Chemins de fer français	IV
11	**Train, J.C.L.**	Permanent Commission of the Association, Commission British Organising and British Railways	I, II, III, IV
751	**Tribelhorn, W.**	Chemins de fer fédéraux suisses	III
34	**Tuja, J.**	Commission Permanente de l'Association et Union Internationale des Chemins de fer	II, III, IV
817	**Tveten, L.**	Chemins de fer de l'Etat norvégien	IV
746	**Übeleis, V.**	Chemins de fer fédéraux autrichiens	IV
952	**U Kyaw Myint**	Burma Railways	I, IV
311	**Unal, J.**	Société Nationale des Chemins de fer français	I
27	**Upmark, E.G.J.**	Commission Permanente de l'Association, Ministère des Communications et Chemins de fer de l'Etat (Suède)	I to V
836	**Urquhart, W.**	East African Railways and Harbours	I, V
273	**Uytborck, E.**	Secrétariat de l'Association Internationale du Congrès des Chemins de fer	II
926	**Valdivieso, M.** (Dr. Ing.)	Chemins de fer de l'Etat italien	IV
177	**Valentine, A.B.B.**	British Organising Commission and London Transport Executive	I, IV
756	**Van Mulders, M.**	Compagnie du Chemin de fer du Bas-Congo au Katanga (Congo belge)	I, IV
760	**Van Simaeys, L.**	Compagnie du Chemin de fer du Bas-Congo au Katanga (Congo belge)	III, IV
754	**Vanzi, I.** (Dr. Ing.)	Federazione Nazionale Imprese Trasporti (Italie)	I, II, V
848	**Vaubourdolle, R.**	Société Nationale des Chemins de fer français	I, II
740	**Vejlö, B.**	Chemins de fer de l'Etat danois	I, II, V
995	**Veličković, D.** (Dr. Ing.)	Chemins de fer yougoslaves	...
281	**Venkataramayya, V.**	Indian Government Railways (Railway Board, India)	I, V
763	**Voordecker, E.**	Office d'Exploitation des Transports Coloniaux « OTRACO » (Belgique)	II, III
539	**Vrebos, J.**	Ministère des Communications (Belgique)	II, IV
251	**Vrielynck, W.**	Société Nationale des Chemins de fer Vicinaux (Belgique)	II, IV, V

Number.	NAME.	DELEGATED BY	SECTIONS.
869	**Walker** (Colonel R.J.)	Companhia do Caminho de Ferro de Benguela	I, II, V
517	**Walter** (Brigadier A. E. M.)	Ministry of Transport and Civil Aviation (Great Britain)	IV
854	**Walter, J.**	Société Nationale des Chemins de fer français	III, V
875	**Wansink, D.J.** (Dr.)	Chemins de fer Néerlandais	IV
277	**Warder, S.B.**	British Railways	II
909	**Watkins, J.W.**	British Railways	I, III, IV
870	**Watts, S.G.**	Companhia do Caminho de Ferro de Benguela	III, IV, V
171	**Webber, W.J.P.**	British Organising Commission	IV
722	**Weissel, A.**	Compagnia delle Ferrovie Danubio-Sava-Adriatico (Italie)	III
758	**Wenes, G.**	Compagnie du Chemin de fer du Bas-Congo au Katanga (Congo belge)	II, V
866	**Wessels Boer, J.**	Chemins de fer Néerlandais	IV
172	**White, A.J.**	British Organising Commission (Member of Arrangements Committee)	I to IV
401	**Whitworth, C.E.**	British Organising Commission (General Secretary) and British Railways	I to IV
749	**Wichser, O.** (Ing.)	Chemins de fer fédéraux suisses	I, II, III
949	**Widhoff, A.**	Compagnie Internationale des Wagons-Lits et des Grands Express européens	III, IV
910	**Wigram, A.F.**	British Railways	III
815	**Wijkman, B.L.**	Chemins de fer de l'Etat suédois	III
512	**Wild, I.**	Ministry of Transport and Civil Aviation (Great Britain)	...
51	**Wilson** (Lt.-Col. G.R.S.)	Permanent Commission of the Association, Ministry of Transport and Civil Aviation and British Organising Commission	II, III
173	**Wilson** (Sir Reginald H.)	British Organising Commission	I, IV
859	**Wood, G.K.**	Sudan Railways	II, III
174	**Wymer, F.J.**	British Organising Commission (Member of Arrangements Committee)	I to V
971	**Yeretzian Kegham**	Chemins de fer de l'Etat syrien, Lignes du Nord	IV
947	**Ytasse, E.**	Compagnie Générale de Voies ferrées d'Intérêt Local (France)	I, II, III
930	**Zattoni, T.** (Dr. Ing.)	Chemins de fer de l'Etat italien	II
945	**Zens, P.M.F.**	Chemins de fer Départementaux (France)	IV
956	**Zographakis, S.**	Chemins de fer de l'Etat hellénique	I, II

OPENING CEREMONY OF THE XVIth SESSION

May 19th, 1954, at 10.30 a. m.

The inaugural meeting of the XVIth Session took place in the splendid ASSEMBLY HALL at CHURCH HOUSE, where numerous vast rooms had been placed at the disposal of the organisers of the London Congress.

Some 500 delegates and a great number of ladies were present at the ceremony, graced by the presence of His Royal Highness the DUKE OF GLOUCESTER, who had consented to be President of Honour of the XVIth Congress of the Association.

His Royal Highness the DUKE OF GLOUCESTER took his place on the centre dais; supporting him were the following personalities;

on the right :

The Right Hon. Alan Tindal LENNOX-BOYD, M.P., Minister of Transport and Civil Aviation;

General Sir BRIAN ROBERTSON, Bart, G.C.B., G.B.E., K.C.M.G., K.C.V.O., D.S.O., M.C., Chairman, British Transport Commission, Member of the Permanent Commission;

Alderman Charles P. RUSSELL, C.V.O., J.P., The Right Worshipful the Mayor of the City of Westminster;

on the left :

Mr. M. DE VOS, Directeur Général de la Société Nationale des Chemins de fer belges, President of the International Railway Congress Association;

Mr. P. GHILAIN, Directeur Honoraire du Service du Matériel et des Achats de la Société Nationale des Chemins de fer belges, Vice-President and General Secretary of the Permanent Commission of the Association;

Mr. Victor MISHCON, D.L., J.P., Chairman of the London County Council;

Many members of the Permanent Commission, the Committee of Honour and the British Organising Commission were also present on the platform, including :

The Right Hon. LORD HURCOMB, G.C.B., K.B.E., Chairman British Transport Commission 1947-1953, Member of the Executive Committee of the Permanent Commission;

Mr. J.M. GOURSAT, Directeur de la Région du Nord de la Société Nationale des Chemins de fer français, Vice-President of the Permanent Commission;

Mr. E. DORGES, Secrétaire Général Honoraire aux Travaux Publics et aux Transports, Délégué Général du Ministre pour les Affaires Internationales au Ministère des Travaux Publics et des Transports de France, Member of the Executive Committee of the Permanent Commission;

Sir Gilmour JENKINS, K.C.B., K.B.E., M.C., Permanent Secretary, Ministry of Transport and Civil Aviation (Great Britain), Member of the Executive Committee of the Permanent Commission;

Sir John Benstead, C.B.E., Deputy Chairman, British Transport Commission, Member of the Permanent Commission.

His Royal Highness the DUKE OF GLOUCESTER, President of Honour of the Session, welcomed the delegates as follows:

« Ladies and Gentlemen,

« In the name of Her Majesty the Queen, and as Honorary President of your Session, I extend a very cordial welcome to the delegates and others who have come to London for this the 16th Session of the International Railway Congress.

« It has ever been the tradition of these islands to welcome to their shores those who come from overseas for peaceful purposes, and this welcome is especially warm when it is made, as now, to the representatives of so many of the railway administrations of the world.

« As the pioneer of railway development it is most natural that over the past century the United Kingdom should have taken the keenest interest in the development of railway techniques in other countries.

« The forum which the International Railway Congress has provided, since its first session in Brussels in 1885, for the interchange of technical and administrative information and ideas about railways has always commended itself to the Government and the railway administrations of this country.

« We welcomed your Congress here last in 1925, the year of the centenary of the First Railway in the world.

« We are particularly glad that you have accepted our invitation to make London the scene of your Congress this year.

« Nothing but good can flow from the free interchange of ideas and experience in the spirit of friendliness and co-operation in which an international organisation such as yours carries on its work.

« I wish the Congress success in that work, and especially in your present proceedings.

« I hope that you will all enjoy your stay in this country.

« There can be no doubt about the pleasure and benefit which we, on our side, will derive from your visit to us.

« It is now my pleasant duty, Ladies and Gentlemen, to declare open this Session of your Congress. » *(Long applause.)*

Mr. DE VOS, President of the Permanent Commission, replied as follows :

« Your Royal Highness,

« On the 27th September 1825, between Stockton and Darlington, for the first time in the world, a steam locomotive hauled on a railway line a public freight train.

« To commemorate this great event, which was to convulse the universal economic system, it was fitting that a hundred years later, in 1925, London should be the seat of the Tenth Session of the International Railway Congress Association.

« It was His Royal Highness the Duke of York, who declared the Session open.

« Previously, the Fifth Session had been inaugurated by His Royal Highness the PRINCE OF WALES.

« To-day, Your Royal Highness, in conveying to the Delegates the words of welcome of Her Majesty The Queen, in consenting to accept the Presidency of the Sixteenth Session and inaugurating it, condescends once more to show the high esteem the Crown has always displayed towards the works of the Congress.

« The inspiring words spoken by Your Royal Highness are the greatest encouragement for us.

« Allow me, on behalf of the delegates of all participating countries, to express most respectfully to the gracious Sovereign of the British Empire, Her Majesty The Queen Elizabeth and to Your Royal Highness our profound gratitude. » *(Long applause.)*

« YOUR ROYAL HIGHNESS,

« LADIES,

« GENTLEMEN,

« We have asked the Minister of Transport and Civil Aviation to act as our ambassador to the members of Her Majesty's Government and inform them of the value we attach to their wholehearted support.

« We know, Mr. Minister, the importance of the personal part you play in this connection, and we are glad to have the opportunity of expressing our heartfelt thanks.

« We appreciate in particular the honour paid us by the presence of these eminent persons at our inaugural meeting; the interest shown is a further proof, if any were needed, of the capital importance of the services the railway continues to render to the public.

« The questions on the agenda of the XVIth Session are mainly of a technical nature.

« It is only in passing that I will allude to what I will call the state of the transport market.

« For a quarter of a century, the road has considerably increased its powers.

« Already in 1937, in Paris, at the XIIIth Session, we find a clear allusion to this phenomenon.

« And now, we see the skies furrowed with machines that become ever more powerful, faster and with a more extensive sphere of action.

« Far from shackling these competing methods of transport, it appears that in the interests of both user and operator, we should decide the rôle which should be allotted to the railways, to navigation, the road and even the air, in such a way that the traffic is harmoniously distributed amongst them, each taking the share economically most suited to its characteristics.

« The coordination of the different methods of transport is the concern of the governments. There is no escaping it, but it will be a fortunate state of affairs if it proves constructive, that is to say it must not in any case be biased against any one method of transport.

« In the meantime, the railway continues on its way, indefatigable in its search after progress.

« Everywhere, it is endeavouring to

Opening Ceremony of the XVIth Congress at Church House.
His Royal Highness the Duke of Gloucester delivering his speech.

Formal Opening Ceremony of the XVIth Session at Church House.

increase the services offered to the public, with the highest possible coefficient of safety, whilst lowering its costs and improving working conditions.

« For this reason, it follows with keen interest all new inventions and whenever possible applies them to its operating methods.

« I will not go into our programme in detail. The questions have been very carefully selected and I wish to pay due homage to the administrations who collaborated in the basic studies and to the reporters who collated the replies received and condensed them so clearly.

« We have not departed from the traditional and well proved method and have distributed the work amongst five sections.

« In the First Section, *Way and Works*, the present tendencies as regards the organisation of permanent way maintenance will be studied; in order to determine the work to be done, they will consider the value of using recording vehicle to test the lines. They will go into the effectiveness of mechanical methods of shovel packing and the renewal of the ballast, as well as for laying rails, etc.

« They will also deal with the modernisation of station buildings, the financial means employed for this purpose, and the standardisation of structural components.

« The Second Section, *Traction and Rolling Stock*, will study the fundamental characteristics of electric traction in its technical and economic aspects.

« The stocks of steam locomotives will however remain considerable and various methods intended to improve still further the output of these engines will be gone into.

« The Third section, *Working*, will deal with radio communications in the operating of railways, the telecontrol of signalling boxes and its technical realisation, electrical devices for operating and controlling the points, and accidental running through of points in the trailing direction.

« The Fourth Section, *General*, will deal with the recruiting of staff, both as regards numbers and quality, the harmonious keeping up of numbers in the different grades, reserves and numbers of employees, the collaboration of the medical services in recruiting of staff.

« It will determine the principles on which the geographical and functional organisation of the railway should be based and will go into methods of simplifying and closing up the administration.

« Finally, it will consider how the railway can participate in road transport undertakings.

« The Fifth Section, *Light Railways and Colonial Railways*, will consider the various aspects of the wear of rails on curves, the causes and remedies.

« The protection of overhead lines, substations and motor stock against accidents of an electrical nature will receive their attention.

« These matters, amongst others, will be gone into very thoroughly. But in addition to the official meetings, the personal contacts which delegates will have with each other, during the technical visits and excursions, will enable them to exchange ideas on many of the subjects with which they are preoccupied, which

are not included in the agenda of the Congress. The benefits to be obtained from such contacts are always invaluable in their results.

« YOUR ROYAL HIGHNESS,

« LADIES, GENTLEMEN,

« Now I must confess that I am afraid of being unable to find the words to translate truly the extent of the gratitude we owe to the British Transport Commission, to the British Railways and the Local Organising Committee.

« We know that in this great Country, hospitality is traditional. But the pains taken by the organizers to save us any trouble, the thoughful attentions showed everywhere, the care with which the visits to great industrial undertakings have been arranged, happy complement to our works, the choice of the excursions for relaxation to carry through the effects of our investigation meetings, all this goes beyond our expectations and we would be struck with wonder but for the charming simplicity of our hosts.

« Our sittings are held in a place fully impregnated by the glory bestowed by Her Majesty The Queen Mary, who layed the foundation stone, and the august attendance of His Majesty The King George VI, who presided at the opening of this edifice.

« It was here that Parliament held its sittings, several times, during the last war.

« We are greatly obliged to His Eminence The Archbishop of Canterbury and to the Church House Corporation Committee, who made the kind gesture of opening to us the doors of this building, where the Country's heart beat, and there is no doubt that our works will reap from it an exceptional brilliancy.

« The wealth of memories imprisoned within these walls turns our thoughts towards those of our colleagues who have disappeared since the last Session :

MM. Germain WILLAERT,
Léon JACOBS,
Axel GRANHOLM,
Raoul DAUTRY,
R. BENJUMEA Y BURIN, Comte de GUADALHORCE,
Auguste MARGUERAT
Gustaf DAHLBECK,
Maurice MARGOT.

« The immense services they have rendered will remain engraved on our memories together with their image and their example will continue to inspire us.

« To end, may I affirm, Your Royal Highness, Ladies and Gentlemen, my complete faith in the value of the harvest which this XVIth Session of the Congress will enable us to reap. »

(Prolonged applause.)

The Rt. Hon. Alan Tindal LENNOX-BOYD, M.P., Minister of Transport and Civil Aviation, then delivered the following speech:

« YOUR ROYAL HIGHNESS,

« YOUR EXCELLENCIES,

« MY LORDS, LADIES AND GENTLEMEN,

« You have been welcomed in the name of Her Majesty the Queen by His

Royal Highness the Duke of Gloucester who has graciously consented to act as your Honorary President. The cordial sentiments which His Royal Highness has expressed are shared by all who recognise the great part which Railways have played, and are still playing, in the progress of civilisation all over the world.

« It is, therefore, my great privilege and pleasure to express to you on behalf of Her Majesty's Government the heartiest welcome to the XVIth Session of the International Railway Congress Association. It gives me much satisfaction that you are assembled together once again in our country which was the birthplace of railways. We are also very pleased that we have the honour to welcome your new President, Mr. De Vos, who is presiding at his first Congress Session, together with his predecessor, Mr. Delory, who has just retired after many years of distinguished leadership of the Association with the very able support of your General Secretary, Mr. Ghilain, who I am glad to say is taking an active part in this Session.

« We fully recognise, not only the interest, but also the value to ourselves and other countries of these gatherings of experts in all branches of railway management, operation and engineering, where the fullest knowledge is brought together and the results of experience acquired under great variety of conditions are interchanged. Nowhere more than among railwaymen is such readiness found to put their experience at the disposal of their fellows most generously and without reservations. Indeed I think it may be said that the common bond of the railway service transcends nationality.

« Much has happened in the world since the Xth Session was held in London in 1925, the Centenary year of British Railways. Times are more difficult for railways almost everywhere if only because the rapid development of road and air transport in the intervening years has destroyed the virtual monopoly which the railways once held. The inherent capacity of railways to carry heavy loads of passengers and freight at high average speeds in great safety seems to assure their continuance for many years to come, but with strong competition from other modes of transport, and the greatly increased cost of labour and material, there is more need than ever before for modernisation, and efficiency and economy in working, which must always benefit from the study of current developments in railways of all countries.

« Your President has outlined to you the subjects you are going to discuss in London. Firstly there is the track, as the foundation of the railway, and the stations, and special attention will be given to modern methods of economical construction and maintenance.

« Under the heading of Locomotives and Rolling Stock, the comparative methods of different systems of electrification will be considered in the light of far-reaching experiments with alternating current traction at standard frequency which are now in progress. After considerably more than a century of most reliable service the steam locomotive is perhaps entering the last phase of its history, but the general displacement of steam traction is still a long way off. It is still necessary to develop its efficiency and economy to the utmost, and I am

sure that all of you will profit from your discussions on this subject also.

« In the field of Operation, technical developments in recent years have secured great economies with improved traffic flow by the centralised remote control of signalling installations. You will be exchanging your experiences of these methods, and for the first time at a Congress Session you will be considering the application of radiophonic communication to railway working.

« There will also be discussion on some special problems affecting Colonial Railways and the Light Railways which play such an important part in public transport on the Continent of Europe, but the Questions to be discussed under this heading may well be of interest to main line administrations also.

« The best technical methods, however, cannot be fully effective without harmonious relations between all grades of the staff and this most important subject is also to be considered, as well as the complex and sometimes controversial question of Railway Organisation to which it is related.

« I am sure you will understand that at such a large Congress no useful discussions could take place on any of the subjects I have mentioned without the most careful preparation and summarisation, and I should like to express the appreciation of Her Majesty's Government of the able and painstaking work of the delegates who have acted as the Reporters.

« To the Foreign Delegates and their ladies Her Majesty's Government will, so far as they can, do their best to make their stay in Great Britain both pleasant and profitable, though I am sure you will all make generous allowance for the notorious unreliability of the British climate which I am afraid is beyond all Government control.

« Her Majesty's Government also desire to associate themselves with the tribute to the memory of those distinguished members whose loss the Association has suffered since the last Congress. Their works are a memorial and an inspiration to whose who follow them.

« This XVIth Congress without doubt will prove the vitality of your Association and Her Majesty's Government most heartily wish you all success and prosperity in your labours » *(Great applause.)*

Sir BRIAN ROBERTSON, Chairman of the British Transport Commission, then welcomed the Delegates as follows :

« YOUR ROYAL HIGHNESS,

« YOUR WORSHIP,

« MY LORDS, LADIES AND GENTLEMEN,

« It is my privilege and my pleasure, as Chairman of the British Transport Commission, to offer you, on behalf of British Railways and London Transport, a cordial welcome to this Congress.

« As Monsieur De Vos has said, it is in accord with the precedents of the previous London Congresses in 1895 and 1925 that a member of our Royal Family should graciously accept the office of Honorary President. But, the opening of our proceedings this morning coincides with the visit of our Queen to the City of London to commemorate Her Majesty's safe return from her Commonwealth tour,

and we are signally honoured that His Royal Highness The Duke of Gloucester has, on such a day, contrived to spare some of his valuable time to be with us.

« In 1925, when the Congress was last held in London, the railways of Great Britain were recovering from the effects of war and were carrying out a major re-organisation following the amalgamation of the hundred or so separate companies into four main groups. 1954 sees the railways of this country once more overtaking the effects of a war and yet again in the midst of another administrative re-organisation.

« The President of the Association recalled that the Congress of 1925 was arranged to coincide with the centenary of the Stockton and Darlington line — the first railway in the world to be open to the general public, employing locomotive power and providing for the conveyance of passengers against payment of fares. To-day, we are well into the next railway century, but our faith in the fundamental economics and efficiency of the railways for suitable traffics remains undiminished.

« Great Britain is indeed proud to have been the birthplace of railways and proud to acknowledge George Stephenson as one of her greatest sons. From the Stockton and Darlington line, British Railways have grown into a great enterprise of 52 000 track miles, employing 600 000 persons, and claiming to be the busiest system in the world. Every week-day, they carry some 2 700 000 passengers and nearly 1 000 000 tons of freight; they own some 19 000 locomotives, 42 000 carriages and well over 1 000 000 freight wagons.

« All this is quite apart from the system of the London Transport Executive. The London Metropolitan of 1863 between Paddington and Farringdon was the first underground railway, and London Transport to-day is the world's largest urban passenger transport undertaking, the railways of which alone convey nearly 600 million passengers every year.

« But, the pioneer must always be alert, to ensure that the methods and techniques of the early exploratory days are not accepted without challenge as a pattern for all time. The British Transport Commission, in confirmation of their faith in the future of railway transport, believe that the stage has been reached when imaginative and bold measures should be adopted for modernisation and development on a large scale. They believe that there is a sound economic case for such measures in the interest of traders, of passengers and of the well-being of the nation, and they have recently set themselves the task of formulating a plan to this end. This great Congress will, fortunately, provide the opportunity for the members and officers of the Commission frankly and freely to discuss with their colleagues from overseas all the advances that are now being made, or that are in sight, in the operating, engineering and commercial aspects of railway work.

« Most of us in these days believe that some form of co-ordination or co-operation between the various forms of transport is necessary. This does not mean that we expect the railway industry to be protected from all competition. That would be impossible, and moreover we should have more confidence in the

industry than to ask for it. The industry must be ever diligent and resourceful in the practical application of science to its equipment. It must adopt the best modern methods of management. It must adjust its services to meet the changing requirements of trade and the travelling public. Provided that it does these things, the railways industry still has an assured and major part to play in the economic and social life of a nation and of a continent. Railway work will continue to be a fine calling for men of character and brains.

« British Railways in recent years have become increasingly aware of the value of international co-operation. Some of the delegates from the continent of Europe and from Ireland are already in close and friendly touch with British railwaymen, in the joint endeavour to provide efficient train connexions with the ships across the narrow seas, including the two train ferry services via Harwich and via Dover, which daily bring into the heart of this country through wagons of freight and through sleeping cars from abroad. In greeting these colleagues, may I say that we hope this meeting may still further enhance the happy relations which exist. There may be others — possibly, from more distant lands — who are visiting Great Britain for the first time. I trust that they will find the Congress and its associated activities both stimulating and interesting, that they will make new and lasting friendships among the railwaymen of Great Britain and that they may be induced to come and see us again at greater leisure in the future.

« As I understand that I shall address you again later, it will be sufficient now if I express the belief that this opening ceremony, under the honorary presidency of His Royal Highness and in the presence of His Worship The Mayor of Westminster and of the Minister of Transport and Civil Aviation will prove an encouraging beginning for a memorable session. »

(Great applause.)

After this speech, His Royal Highness the DUKE OF GLOUCESTER left the meeting, saluted by the applause of the Assembly.

Mr. DE VOS *then took the chair and made the following speech :*

« Ladies and Gentlemen,

« The Right Honourable Alan Tindal LENNOX BOYD, Minister of Transport and Civil Aviation, for the Government, and General Sir Brian ROBERTSON, for the British Transport Commission, have addressed us in terms for which we are very grateful.

« Their amability greatly touches us, and I am sure that I am interpreting your unanimous feelings in telling them how greatly we are obliged to them.

« The Permanent Commission submits for your approval the proposition to make the Right Hon. Alan Tindal LENNOX-BOYD *Honorary Vice President* of the XVIth Session. *(Applause.)*

« I am sure you will all wish to give the effective Presidency of the Session to General Sir Brian ROBERTSON, President of the British Transport Commission, whose competence and proverbial affability promise us brilliant results.

(Applause.)

Royal Highness the Duke of Gloucester who has graciously consented to act as your Honorary President. The cordial sentiments which His Royal Highness has expressed are shared by all who recognise the great part which Railways have played, and are still playing, in the progress of civilisation all over the world.

« It is, therefore, my great privilege and pleasure to express to you on behalf of Her Majesty's Government the heartiest welcome to the XVIth Session of the International Railway Congress Association. It gives me much satisfaction that you are assembled together once again in our country which was the birthplace of railways. We are also very pleased that we have the honour to welcome your new President, Mr. de Vos, who is presiding at his first Congress Session, together with his predecessor, Mr. Delory, who has just retired after many years of distinguished leadership of the Association with the very able support of your General Secretary, Mr. Ghilain, who I am glad to say is taking an active part in this Session.

« We fully recognise, not only the interest, but also the value to ourselves and other countries of these gatherings of experts in all branches of railway management, operation and engineering, where the fullest knowledge is brought together and the results of experience acquired under great variety of conditions are interchanged. Nowhere more than among railwaymen is such readiness found to put their experience at the disposal of their fellows most generously and without reservations. Indeed I think it may be said that the common bond of the railway service transcends nationality.

« Much has happened in the world since the Xth Session was held in London in 1925, the Centenary year of British railways. Times are more difficult for railways almost everywhere if only because the rapid development of road and air transport in the intervening years has destroyed the virtual monopoly which the railways once held. The inherent capacity of railways to carry heavy loads of passengers and freight at high average speeds in great safety seems to assure their continuance for many years to come, but with strong competition from other modes of transport, and the greatly increased cost of labour and material, there is more need than ever before for modernisation, and efficiency and economy in working, which must always benefit from the study of current developments in railways of all countries.

« Your President has outlined to you the subjects you are going to discuss in London. Firstly there is the track, as the foundation of the railway, and the stations, and special attention will be given to modern methods of economical construction and maintenance.

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« You have already heard something of Church House and its associations. It was in the Hoare Memorial Hall, where you registered, that the House of Commons met in dark days for this country and where Winston Churchill spoke imperishable words, which are recorded on a plaque in the hall, as follows:

> «..... in inaugurating a new Session of Parliament, we proclaim the depth and sincerity of our resolve to keep vital and active, even in the midst of our struggle for life.....those parliamentary institutions which have served us so well, which have proved themselves the most flexible instruments for securing ordered unceasing change and progress: which, while they throw open the portals of the future, carry forward also the traditions and glories of the past.,.....».

« While our Congress makes no claim to be a parliament, these words can surely be an inspiration to us. It remains for me to express, on your behalf, our appreciation of the work of the various reporters, who have so diligently prepared the reports which form the basis for your discussions in the sections, and in bringing this meeting to a close, to hope that they will result in interesting and worth while conclusions. »

(Long applause.)

The sitting came to an end at 11.0 a.m. amidst the enthusiastic applause of the assembly.

GENERAL BUREAU OF THE XVIth SESSION.

President of Honour :

H.R.H. The Duke of Gloucester.

Honorary Vice-President :

The Rt. Hon. Alan Tindal Lennox-Boyd, M.P. Minister of Transport and Civil Aviation.

President :

General Sir Brian H. Robertson, Bart., G.C.B., G.B.E., K.C.M.G., K.C.V.O., D.S.O., M.C., Chairman, British Transport Commission, member of the Permanent Commission of the Association.

Vice-President :

Sir John Benstead, C.B.E., Deputy Chairman, British Transport Commission, member of the Permanent Commission of the Association.

Vice-Presidents by privilege (*) :

Argentine. — M. Jesus Martinez.

Austria. — V. Übeleis, Minister a.D., Generaldirektor der Oesterreichischen Bundesbahnen.

Belgium. — M. Malderez, Secrétaire Général du Ministère des Communications, membre de la Commission Permanente de l'Association.

Burma. — U. Kyaw Myint, District Engineer, Burma Railways.

Ceylon. — M.M. Greve, Divisional Transportation Superintendent, Ceylon Government Railway.

Denmark. — P. Christensen, Secrétaire Général au Ministère des Travaux Publics.

Egypt. — A.M. Rizk, Directeur Général des Chemins de fer de l'Etat égyptien, membre de la Commission Permanente de l'Association.

Finland. — W.I. Häkkinen, Chef de Section au Ministère des Transports et des Travaux Publics.

France. — E. Dorges, Secrétaire Général Honoraire aux Travaux Publics et aux Transports, Délégué Général du Ministre pour les Affaires Internationales au Ministère des Travaux Publics, des Transports et du Tourisme, membre de la Commission Permanente de l'Association.

Germany. — Prof. Dr.-Ing. E. Frohne, Erster Präsident der Deutschen Bundesbahn, membre de la Commission Permanente de l'Association.

Grecce. — A. Lebessis, Directeur des Voies ferrées au Ministère des Communications.

India. — F. Ch. Badhwar, Chairman, Railway Board, Ministry of Railways, Government of India, member of the Permanent Commission of the Association.

Iran. — Ing. K. Hédayat, Conseiller et Envoyé spécial pour l'Europe des Chemins de fer d'Etat Iraniens.

République of Ireland. — T.C. Courtney, Chairman of the Coras Iompair Eireann, member of the Permanent Commission of the Association.

Italy. — Dr.-Ing. Vito Perrone, Inspecteur Général Supérieur de la Motorisation Civile et des Transports concédés, membre de la Commission Permanente de l'Association.

Luxemburg. — A. Clemang, Commissaire du Gouvernement pour les Chemins de fer.

Norway. — H.E. Stokke, Directeur Général des Chemins de fer de l'Etat norvégien, membre de la Commission Permanente de l'Association.

(*) Art. 13 of the Rules and Regulations.

New Zealand. — R.F. MARRIOTT, Advisory Engineer, New Zealand Government Railways.

Netherlands. — G.H. DIJKMANS van GUNST, Docteur en Droit, Directeur de la Division « Transports » à la Direction Générale des Transports au Ministère des Transports et du Waterstaat.

Poland. — L. GEHORSAM, Directeur de l'Institut des Etudes Scientifiques Ferroviaires, Ministère des Chemins de fer.

Portugal. — Mario DIAS TRIGO, Directeur des Services d'Exploitation et du Matériel de la Direction Générale des Transports terrestres au Ministère des Communications, membre de la Commission Permanente de l'Association.

Spain. — J. de AGUINAGA, Director General de Ferrocarriles, Tranvias y Transportes por carretera, membre de la Commission Permanente de l'Association.

Sweden. — E.G.J. UPMARK, Directeur Général en Chef des Chemins de fer de l'Etat suédois, membre de la Commission Permanente de l'Association.

Switzerland. — R. KUNZ, Directeur de l'Office Fédéral des Transports, membre de la Commission Permanente de l'Association.

Syria. — Abdel-Karim CHAMY, Chef du Bureau Technique du Service de la Voie et des Bâtiments des Chemins de fer de l'Etat Syrien — Lignes du Nord.

United Kingdom of Great Britain and Northern Ireland and the territories for whose international relations the U.K. is responsible. — Sir Gilmour JENKINS, K.C.B., K.B.E., M.C., Permanent Secretary, Ministry of Transport and Civil Aviation, member of the Permanent Commission of the Association.

Union of South Africa. — D.H.C. DU PLESSIS General Manager, South African Railways and Harbours.

Viet-Nam. — LE-QUANG-HUY, Ingénieur en Chef des Régies Ferroviaires de la France d'Outre-Mer, Ministre des Travaux Publics et des Communications.

Yugoslavia. — B. BOGAVAC, Directeur Général des Chemins de fer Yougoslaves.

General Secretaries :

P. GHILAIN, Directeur Honoraire du Service du Matériel et des Achats de la Société Nationale des Chemins de fer belges, Vice-Président et Secrétaire Général de la Commission Permanente de l'Association.

Ch. E. WHITWORTH, Assistant to Chief Officer (Administration), British Transport Commission.

BUREAU OF THE SECTIONS.

SECTION I. — Way and Works.

Presidents :

J.C.L. TRAIN, Member of the British Transport Commission, member of the Permanent Commission of the Association.

Vice-President :

J. de AGUINAGA, Director General de Ferrocarriles, Tranvias y Transportes por carretera, membre de la Commission Permanente de l'Association.

A.M. RIZK, Directeur Général des Chemins de fer de l'Etat Egyptien, membre de la Commission Permanente de l'Association.

J. LOHMANN, Chef du Service de la Voie et des Travaux aux Chemins de fer Néerlandais, S.A.

M. SCHANTL, Secrétaire Général des Chemins de fer fédéraux autrichiens, membre de la Commission Permanente de l'Association.

Principal Secretary :

J. DUBUS, Ingénieur en Chef attaché à la Direction Générale de la Société Nationale des Chemins de fer belges, Secrétaire Technique à l'Association Internationale du Congrès des Chemins de fer.

Secretaries :

J. UNAL, Ingénieur, Chef de la Subdivision Entretien de la Région de la Méditerranée de la Société Nationale des Chemins de fer français.

J.H. GLENDINNING, District Engineer, Eastern Region, British Railways.

SECTION II. — Locomotives and Rolling Stock.

President :

M. J. GOURSAT, Directeur de la Région du Nord de la Société Nationale des Chemins de fer français, Vice-Président de la Commission Permanente de l'Association.

Assistant :

A. PARMANTIER, Directeur du Matériel et de la Traction, Société Nationale des Chemins de fer français.

Vice-Presidents :

H.E. STOKKE, Directeur Général des Chemins de fer de l'Etat norvégien, membre de la Commission Permanente de l'Association.

O. WICHSER, Directeur Général des Chemins de fer fédéraux suisses.

E.D.F. TERKELSEN, Directeur Général des Chemins de fer de l'Etat danois, membre de la Commission Permanente de l'Association.

Principal Secretary : E. UYTBORCK, Ingénieur Principal au Service du Matériel et des Achats de la Société Nationale des Chemins de fer belges, Secrétaire Technique à l'Association Internationale du Congrès des Chemins de fer.

Secretaries :

A.E. BERESFORD, Mechanical and Electrical Engineer, Eastern & North Eastern Regions, British Railways.

R. HOMMERIN, Inspecteur de 1re classe au Service du Matériel et de la Traction de la Région du Sud-Ouest de la Société Nationale des Chemins de fer français.

SECTION III. — Working.

President : Prof. Dr.-Ing. W. SCHMITZ, Bundesbahndirektor, Deutsche Bundesbahn.

Vice-Presidents : A. CLEMANG, Commissaire du Gouvernement luxembourgeois;

C. MELISSINOS, Directeur Général des Chemins de fer de l'Etat hellénique;

F.L. LEHTINEN, Directeur en Chef des Chemins de fer de l'Etat de Finlande, membre de la Commission Permanente de l'Association.

Principal Secretary : MARCHAL, Ingénieur Principal au Service de l'Exploitation de la Société Nationale des Chemins de fer belges.

Secretaries :

F. ROMANN, Inspecteur Divisionnaire à la Direction des Installations Fixes (Division des Installations de Sécurité), Société Nationale des Chemins de fer français;

E.G. BRENTNALL, Assistant Signal and Telecommunications Engineer, London Midland Region, British Railways.

SECTION IV. — General.

President : Dr. G. RENZETTI, Inspecteur en Chef Supérieur, Chef de la Section Commerciale aux Chemins de fer de l'Etat italien.

Vice-Presidents : M. DIAS TRIGO, Directeur des Services d'Exploitation & du Matériel de la Direction des Transports terrestres au Ministére des Travaux Publics et des Communications du Portugal, membre de la Commission Permanente de l'Association.

F. Ch. BADHWAR, Chairman, Railway Board, Ministry of Railways, Government of India, member of the Permanent Commission of the Association.

E.G.J. UPMARK, Directeur Général en Chef des Chemins de fer de l'Etat suédois, membre de la Commission Permanente de l'Association.

Principal Secretary : H. Lenfant, Ingénieur Principal Honoraire de la Société Nationale des Chemins de fer belges.

Secretaries :

M. Gaveau, Représentant Général Adjoint de la S.N.C.F. en Grande-Bretagne;

P. Punt, British Railways.

SECTION V. — Light Railways and Colonial Railways.

President : W. Vrielynck, Directeur-Général adjoint de la Société Nationale des Chemins de fer Vicinaux (Belgique).

Vice-Presidents : T.C. Courtney, Chairman of the Coras Iompair Eireann, member of the Permanent Commission of the Association;

A. Barbaut, Directeur de la Compagnie Fermière des Chemins de fer tunisiens.

Principal Secretary : N. Charlier, Ingénieur à la Société Nationale des Chemins de fer Vicinaux (Belgique).

Secretaries :

B. Broca, Chef de Section Principal à la Société Nationale des Chemins de fer français;

R.E.F. Oggier, Executive Assistant, Development and Research Office, British Transport Commission.

DATES	SECTION I — WAY AND WORKS	SECTION II LOCOMOTIVES AND ROLLING STOCK
Wednesday 19th May . . *10.30 a.m.*	←	Inaugural Meet
Thursday 20th May. . . . *9 a. m.* – *9.30 a.m.*	Installation of the Section and fixing the programme of procedure. — 1. What are the present tendencies relating to the organization of the maintenance of the permanent way : methods of determination of the works to be done and in particular, possibilities of the use of detecting-recording coaches; planning of the works, effects of mechanization; importance of the side-tracks for the movement of the gangs and the mechanical devices. Economic and financial aspect.	Installation of the Section and fi the programme of procedure. — 4. Means and methods to improve efficiency of steam locomoti *a*) increase of the steam press *b*) types of grates; *c*) superheatin the steam; *d*) preheating of the fee water; *e*) feed water treatment,
Friday 21th May . . . . *9 a. m.*	1. What are the present tendencies relating to the organization of the maintenance of the permanent way : methods of determination of the works to be done and in particular, possibilities of the use of detecting-recording coaches; planning of the works, effects of mechanization; importance of the side-tracks for the movement of the gangs and the mechanical devices. Economic and financial aspect. *(Continuation and end.)*	4. Means and methods to improve efficiency of steam locomotive *a*) increase of the steam press *b*) types of grates; *c*) superheatin the steam; *d*) preheating of the fee water; *e*) feed water treatment, *(Continuation and end.)*
Monday 24th May . . . . *9 a. m.*	2. Modernisation of station buildings and methods employed in financing modernisation projects. Standardisation of unit construction applied to railway buildings.	3. Technical and economic inves tion of the basic characteristic electric traction systems now in with a view to decide whether, to what extent, there are rele reasons for preferring one syste another. In particular are there reasons in regard to : *a*) power ply; *b*) overhead line and fixed installations; *c*) motive power u *d*) working and maintenance cos
Tuesday 25th May . . . *9 a. m.* – *11 a. m.*	2. Modernisation of station buildings and methods employed in financing modernisation projects. Standardisation of unit construction applied to railway buildings. *(Continued.)* ←	3. Technical and economic investig of the basic characteristics of ele traction systems now in use, w view to decide whether, and to extent, there are relevant reason preferring one system to anot *(Continued.)* Ple
Wednesday 26th May . . *9 a. m.* – *3 p. m.* – *4 p. m.*	2. Modernisation of station buildings and methods employed in financing modernisation projects. Standardisation of unit construction applied to railway buildings. *(Continuation and end.)* ← ←	3. Technical and economic investig of the basic characteristics of ele traction systems now in use, w view to decide whether, and to extent, there are relevant reason preferring one system to anot *(Continuation and end.)* Ple Closing cere

SECTION III — WORKING	SECTION IV — GENERAL	SECTION V LIGHT RAILWAYS AND COLONIAL RAILWAYS
Sess'on ———	———	——— →
lation of the Section and fixing programme of procedure. — Remote operating of signal boxes : nical realizations, working or- s; *b*) Electric working and control ices for hinged and « flexible » nts and switches. Control of acci- tal trailing of the switch blade.	Installation of the Section and fixing the programme of procedure. — 7. Modernisation of the methods to be adopted for recruiting the staff in number and qualification. Harmonious renewal of the various ranks. indispensable reserve lists, ratio of the permanent and temporary staff. Part played by the medical service in the recruiting.	Installation of the Section and fixing the programme of procedure. — 10. Wear of rails on curves : *a*) characteristics of track-laying on curve and details of the rolling stock liable to cause premature wear of the rails; *b*) running effects of locomotives and motor coaches with motor bogies; *c*) results of the investigations made and proposed remedies. Use of rail-lubrication processes.
Remote operating of signal boxes : nical realizations, working or- s; *b*) Electric working and control ices for hinged and « flexible » nts and switches. Control of acci- tal trailing of the switch blade. *ntinuation and end.)*	7. Modernisation of the methods to be adopted for recruiting the staff in number and qualification. Harmonious renewal of the various ranks, indispensable reserve lists, ratio of the permanent and temporary staff. Part played by the medical service in the recruiting. *(Continuation and end.)* 8. Determination of the principles of geographical and functional organisation of a railway system. Simplification and retrenchment of the administration of railways.	10. Wear of rails on curves : *a*) characteristics of track-laying on curve and details of the rolling stock liable to cause premature wear of the rails; *b*) running effects of locomotives and motor coaches with motor bogies; *c*) results of the investigations made and proposed remedies. Use of rail-lubrication processes. *(Continuation and end.)*
liophonic communications in rail- working.	8. Determination of the principles of geographical and functional organisation of a railway system. Simplification and retrenchment of the administration of railways. *(Continuation and end.)*	11. Protection of overhead lines, substations, locomotives and motor-coaches against accidents of electric nature (excess voltage, overloads, short-circuits, lightning).
iophonic communications in rail- working. *(Continued.)*	9. Railway participation in road transport undertakings.	11. Protection of overhead lines, substations, locomotives and motor-coaches against accidents of electric nature (excess voltage, overloads, short-circuits, lightning). *(Continued)*
ing ———	———	——— →
iophonic communications in rail- working. *(Continuation and end.)*	9. Railway participation in road transport undertakings. *(Continuation and end.)*	11. Protection of overhead lines, substations, locomotives and motor-coaches against accidents of electric nature (excess voltage, overloads, short-circuits, lightning). *(Continuation and end.)*
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e Session ———	———	——— →

Summary report of the discussions in the sections.

SECTION I. — Way and Works.

President : J. C. L. TRAIN.

Vice-Presidents : J. DE AGUINAGA, A. M. RIZK, J. LOHMANN, and M. SCHANTL,

Principal Secretary : J. DUBUS.

QUESTION 1.

What are the present tendencies relating to the organisation of the maintenance of the permanent way : methods of determination of the works to be done and in particular, possibilities of the use of detecting-recording coaches; planning of the works, effects of mechanisation; importance of the side-tracks for the movement of the gangs and the mechanical devices.

Economic and financial aspect.

Preliminary documents.

Report (America (North and South), Australia (Commonwealth of), Burma, Ceylon, Denmark, Egypt, Finland, India, Indonesia, Irak, Iran, Republic of Ireland, New Zealand, Norway, Pakistan, South Africa, Sweden and the United Kingdom of Great Britain and Northern Ireland and the territories for whose international relations the United Kingdom is responsible), by O. Hjelte CLAUSSEN. (See *Bulletin* for August 1953, p. 471, or separate issue No. 1.)

Report (Belgium and Colony, France and French Union, Greece, Italy, Luxemburg, Netherlands, Portugal and Colonies, Spain, Switzerland, Syria and Turkey), by C. FEYRABEND. (See *Bulletin* for December 1953, p. 993, or separate issue No. 15.)

Report (Austria, Bulgaria, Czechoslovakia, Hungary, Poland, Rumania and Yugoslavia), by Dr. Ing. habil. G. SCHRAMM. (See *Bulletin* for March 1954, p. 269, or separate issue No. 21.)

Special Reporter : Dr.-Ing. habil. G. SCHRAMM. (See *Bulletin* for May 1954, p. 499.)

Report of Section I.

(See the *Congress Daily Journal*, No. 2, pp. 3/5; No. 3, pp. 2/3; No. 4, pp. 2/3 and N°. 5, p. 9.)

Meeting held on the 20th May, 1954.

The PRESIDENT asked Mr. DUBUS, *Principal Secretary*, to read out the summaries of the Special Report of Dr.-Ing. habil. GERHARD SCHRAMM.

Mr. DUBUS read out successively these Summaries.

Summary No. 1 :

1. The maintenance work of the length gangs varies in different Railway systems according to circumstances such as climate, density of population, wages, social and economic conditions, cost of materials, living standards, etc.

— *Summary No. 1* was adopted without remark.

Summaries Nos. 2, 3 and 4 :

2. Until recently the permanent way gangs have generally been organised as short length gangs responsible for the entire maintenance work of the track length in question (supervision, maintenance work proper, as for instance levelling, lining, gauging, weed killings, etc.) and various other works of local character, such as relief of permanent level crossing keepers.

3. If the situation due to the development of other kinds of transport has reduced the traffic on certain secondary lines, the fight against such competition had led, in order to reduce the working costs, to run over most other routes heavier and heavier wagons hauled by engines on which the weight on the driving axles has tended to increase more and more, whilst the actual speeds have become higher and higher.

4. Especially in countries where increasing wages have made it necessary to get the very most out of the working power, trials have successfully been started with longer gang lengths or with mobile gangs in connection with reduced local gangs.

The introduction of such gangs permits :

a) the reduction of the number of gangers as well as of the supervision personnel and better organisation of the work;

b) the extension of mechanisation;

c) the specialisation of the gangers;

d) the production of more uniform and probably more durable work;

e) the greater ability for the gang to carry out major items of track work.

Considerable discussion followed on the drafting of *Summaries Nos. 2, 3* and *4.*

M. R. Lévi *(French National Railways)* considered that these questions raised a number of considerations. He stressed that *Summary No. 3* was not in accordance with what was implied in the title. The question submitted concerned the tendencies regarding the organisation of track maintenance; it seemed unnecessary to discuss the movement of heavy wagons or the weight on driving axles.

He stated also that from *Summary No. 4* it might be deduced that it was difficult economic conditions that had lead certain systems to consider mechanisation. It should be made quite clear that railways had not waited until difficult situations had arisen before reducing expenses and that the problem had always been to reduce labour costs, even on those systems in a good financial situation.

Prof. Dobmaier *(Deutsche Bundesbahn)* agreed in general with these remarks, but he considered that *Summary No. 2* should indicate more clearly the advantages and disadvantages of resorting to the use of private contracts.

Mr. Portmann *(Swiss Federal Railways)* considered likewise that recourse to the employment of contractors would be of definite benefit to railways in that work could be concentrated in a few months. He hoped that mention would be made of this in the summaries.

M. Lohmann *(Netherlands Railways and Vice-President)* stated that the calculations of the number of men necessary in a gang should be based on the speed, tonnage, the track maintenance equipment, the motive power used, the formations, the gradient sections, the level crossings, etc.

M. R. Lévi stressed that the difficulties in providing relief for crossing keepers made it difficult to realise a reduction in the gang strength.

M. Renda *(Italian State Railways)* signified his agreement with M. Port-

MANN'S observations, and stressed that the delay in carrying out works could be reduced to a minimum by the employment of contractors.

Mr. TRAIN *(President)* suggested that a sub-committee should be formed to consider a new draft of items 2, 3 and 4. This sub-committee, composed of the *President* and Messrs. R. LÉVI, LOHMANN, SCHRAMM, *Special Reporter*, and SMITH *(Honorary Committee of the British Organizing Commission)*, met after the session and re-drafted the text as follows, which it will submit for the approval of the Section at the session on the 21st. May.

« 2. Up to the last year or two, length gangs were generally organised in small gangs (4 or 5 men) responsible for all maintenance work on the length in question (inspections, maintenance work proper, as for instance levelling, lining, gauging, weedkilling, etc.) and various other work of local character such as relief of permanent level crossing keepers.

« The burden arising from these tasks, as well as lodging difficulties and transport of personnel, make it difficult for the administrations to realise a reduction in the manpower employed in day to day track maintenance. »

« 3. Railway Administrations endeavour to reduce to a minimum track maintenance costs with due consideration to the necessity of carrying a constantly increasing speed and weight of traffic in comfort and security. »

« 4. (i) Especially in countries where increasing wages have made it necessary to get the very most out of the man-power, trials have successfully been undertaken in which the following two fundamental tendencies appear :

« *a*) the search for an improvement in overall productivity by the concentration of personnel in longer gang lengths with a strength of at least 8 men, or by the use of mobile gangs in conjunction with reduced local gangs.

« *b*) the search for an improvement in individual productivity by the use of motorised tools which allow of the same individual carrying out more easily some more important works. »

« 4. (ii) The solutions agreed should allow of :

« *a*) the reduction in the overall number of gangers and a better organisation of the work ;

« *b*) a greater continuity and more clearly defined tasks allotted to each ganger ;

« *c*) the production of more uniform and probably more durable work ;

« *d*) the carrying out of relatively important track work may fall within the scope of private enterprise. »

« 4. (iii) The economic and density of population factors have an important influence on the predominance accorded to one or the other of the tendencies in the solutions applied : each of them having, moreover, its limits of application. The same factors can tend to increase or reduce that part of renewal of track let to contract. »

« 4. (iv) Concentration allows the management to follow more closely the work carried out by the gang. On the other hand, the social advantages of personnel returning each evening to their homes

should not be overlooked. This is a question to which the men, in general, attach great importance.

« Mechanisation is already largely applied to major renewals in connection with which the question no longer arises. For the smaller works of day to day maintenance its application should be more carefully considered. It necessitates a very precise application of the works to be done in order to avoid unnecessary operations.

« To get the best result from the use of mechanical tools supervisors and operators must be well trained in their use and daily maintenance. »

It should be noted that this new text involves at least in part, *Summaries Nos. 9* and *12*, and note should be taken of this in the discussion to follow.

Summary No. 5 :

5. The determination of the maintenance works to be done has for many years generally been based on :

a) the experience of the durability of the work under the local conditions involved (predetermined cycles). This depends partially on an estimate and can vary much from place to place;

b) the very careful examination in the field of the track (systematic surveys). These surveys are complicated and take much time;

c) the appearance of trouble in the track. When this takes place defects may be so developed that they are beyond repair.

M. Queron *(French National Railways)* suggested that the final phrase of paragraph (*c*) should be deleted as it could more appropriately be included at the beginning of *Summary No. 6*.

Summary No. 5 was therefore adopted with this amendment.

M. Julien *(Ministère des Travaux publics et des Transports, France)* stated, however, that the term « durabilité » was incorrect.

The drafting will be considered during the session of the 21st May.

Summary No. 6 :

6. *a*) After recognising the insufficiency of the « stitch in time » method for assuring the proper condition of the permanent way, certain railways have adopted a general overhaul method covering the whole system, which is unnecessarily costly.

The introduction of methodical maintenance covering a periodic general overhaul and a limited overhaul to deal with level, especially at the joints, and tightening up the fastenings, has resulted in considerable savings, especially from the labour point of view.

b) The necessity for maintenance operations is no longer based on a simple estimate of the actual condition of the track, but chiefly on an estimate of the probable rate at which it will wear.

There will be considerable saving due to the reduced mileage to be dealt with, a better definition of the elementary work, and a reduction in the number of intermediate overhauls.

Due note having been taken of the above remarks of M. Queron, *Summary No. 6* was agreed as follows :

« 6. (*a*) After recognising the insufficiency of the « stitch in time » method for assuring the proper condition of permanent way because when work is put in hand the faults may well have reached a stage where they are irreparable, some systems have adopted a general method of overhaul applicable to the whole of the system which is too onerous.

« (*b*) The introduction of methodical maintenance covering a periodic general overhaul and a limited overhaul to deal

with level, expecially at the joints, and tightening up the fastenings, has resulted in savings, especially from the labour point of view.

« (*c*) The necessity for maintenance operations is no longer based on a simple estimate of the actual condition of the track, but chiefly on an estimate of the probable rate at which it will wear.

« There will be important savings due to the reduced mileage to be dealt with, a better definition of the elementary work, and a reduction in the number of immediate overhauls. »

Summary No. 7 :

7. Recording vehicles, particularly those which give an exact position of each rail in the vertical and horizontal planes and their exact gauge, give invaluable services from this point of view, with regard to the factors to which they are sensitive. By the comparison of successive recordings they make it possible to follow the evolution of the condition of a given line.

The use of recording vehicles is of very great economical value, because it permits the maintenance work to be done exactly on the right spot and just at the right moment, with consideration to the track-standard of the entire railway system.

Mr. R. LÉVI suggested that the words « exact » in the first paragraph should be deleted as they were liable to various interpretations.

— *Summary No. 7* was agreed with this modification.

Summary No. 8 :

8. As well for economic as for technical reasons it is of the greatest importance that planning of maintenance works be done under close collaboration between maintenance and operating officers to establish appropriate speed restrictions or the diversion of traffic to other lines or tracks, with due consideration to the traffic and to the type of work involved.

Mr. R. LÉVI recalled that the Enlarged Permanent Commission had made it quite clear at the meeting at Lisbon. He proposed the following draft :

« 8. The question has already been considered in *Summary No. 5* (*a*) of Question 1, Section I, of the Permanent Commission which met at Lisbon on 4th June, 1949, in the following form :

« The maximum output of mechanised equipment for cleaning and screening the ballast, and the removal and replacement of the track, is obtained when it is possible to take advantage in long gaps in the running of trains. This practice allows of a speeding up of relaying operations, of a reduction in the delay in carrying them out in one section of track, in short, to reduce the expense of all services and particularly the expense of slowing up traffic. »

— This text was agreed.

Summary No. 9 :

9. The mechanisation is especially advantageous with larger gangs and contributes greatly to the success of the above mentioned trials. In no case must the constitution of these gangs involve undue movement of the personnel from place to place.

To get the best results from the use of mechanical tools supervisors and operators must be well trained in their use and daily maintenance.

Mr. HÉDAYAT *(Iranian Railways)* emphasised that the question as set out did not stress clearly enough the special conditions obtaining with regard to labour costs in certain countries.

Mr. R. Lévi stated that the two essential ideas should be separated :

— question of mechanisation;

— precautions to be taken with regard to the extensions of this mechanisation.

The extensions to be applied to mechanisation depends on geographical conditions and of the previous importance of the gangs. This point is, however, stressed in the new draft of *Summaries Nos. 2 to 4.*

Col. Wilson *(Ministry of Transport and Civil Aviation, Great Britain)* added that in the English text the word « trials » should read « operations ».

— It was decided that this Summary would be submitted to the sub-committee dealing with the re-drafting and examined in relation to *Summary 4* (iv).

Summary No. 10 :

10. The final summaries adopted at the Enlarged Meeting of the Permanent Commission (Lisbon, June 1949) mention the paths for the movement of the men and machines as follows :

« It is desirable in future in the case of new railway construction or when modifying existing lines to provide large cesses to facilitate the use of mechanical equipment and generating plant. »

Besides this, the existence of such paths is also very desirable for the safety of the men, because in a large measure they reduce the movement of men to and from their place of work on the track.

— Agreed without discussion.

The President closed the Session at 10.30 a.m. to allow of the sub-committee appointed to carry out the re-drafting to meet forthwith.

Meeting held on the 21st May, 1954.

The President opened the session at 9.0 a.m.

Summaries Nos. 2, 3 and 4 :

The new text of *Summaries Nos. 2, 3 and 4*, re-drafted by the Sub-Committee appointed during the last meeting, were read. This text appeared in the *Congress Daily Journal.*

Mr. Julien proposed to substitute in the second paragraph of *Summary No. 2 :* « s'opposent à l'effort constant des Administrations » instead of : « s'opposent à la tendance constante... ». No alteration in the English text is necessary.

He also proposed in *Summary 4* (i) (*a*), this should read, in the French text, « la concentration du personnel en brigades opérant sur des cantons plus longs ». Again no alteration in the English text is necessary.

Mr. Masseron *(Compagnie Fermière des Chemins de fer tunisiens)* would like to see *Summary No. 4* (ii) completed by making clear that the solution adopted should be based on the prior assessment of the work to be done.

Mr. Feyrabend *(Reporter)* agreed that this was the end in view, and stated that this was made clear in the text. He proposed, on the contrary, to clarify the second paragraph of *Summary No. 2*, in the French text, to read as follows : « la charge résultant de ces *derniers* travaux ». No alteration in the English text is necessary.

Mr. SOOD *(Indian Government Railways)* stated that in India the strength of the gangs was important and it would be unwise to state definitely that the strength should be from 4 to 5 men, as stated in the first paragraph of *Summary No. 2.*

Mr. QUERON stated that inspection enters into the difficulties inherent in maintenance, and proposed to modify this at the end of the second paragraph of *Summary No. 2* as follows :

« as well as inspection and the various other works of local character, such as the relief of permanent level crossing keepers. »

The substitution in the French text of the words « tels que » for the word « comme » was made on the suggestion of M. RENDA *(Italian State Railways)*. No alteration in the English text is necessary.

On the other hand, M. RENDA stressed that in the discussions of the 20th May, he signified his agreement with the observations of M. PORTMANN. He emphasised that in this connection he had envisaged mobile length gangs as well as private contractors, and he showed that the speeding up of the work was accompanied by a reduction in the necessary manpower.

Mr. R. LÉVI *(S.N.C.F.)* suggested in order to satisfy Mr. SOOD that « 4 or 5 men » should read « less than 6 men ».

Mr. VEJLÖ *(Danish State Railways)* stated that in order to avoid any special difficulties which might arise, no mention should be made of the number of men in the gang.

To give consideration to the remarks of MM. SOOD and VEJLÖ, the PRESIDENT suggested that this question should be reviewed; subject to this, *Summaries Nos. 2, 3* and *4*, as re-drafted, were adopted.

Summary No. 5 :

Following his comments on the 20th May, Mr. JULIEN proposed that paragraph (*a*) be re-drafted in the French text only as follows : « L'expérience de la *durée probable du résultat* des travaux... ». No alteration in the English text is necessary.

Summary 5 was finally adopted as hereafter :

« 5. The determination of the maintenance works to be done has for many years been based on :

(*a*) the experience of the durability of the work under the local conditions involved (predetermined cycles). This depends partially on an estimate and can vary much from place to place;

b) the very careful examination in the field of the track (systematic surveys). These surveys are complicated and take much time;

c) the appearance of trouble in the track.

Summary No. 10 :

Dr. SCHRAMM referred back to *Summary No. 10* and asked that mention be made of the difficulties in maintaining the necessary width of cess where there were structures carrying overhead wires for electrification.

Mr. R. LÉVI considered that it was essential to maintain the continuity of

the « side path » when electrification was being carried out.

With due regard to these remarks *Summary No. 10* was completed by a 4th. paragraph worded as follows :

« It is equally desirable to maintain the continuity of the « side paths » when electrification is being carried out ».

Agreed.

Summaries Nos. 11, 12, 13 and 14 :

11. The factors in the evolution of maintenance : concentration of the gangs, organisation of the work and mechanisation, are capable of giving considerable economies compared with the present position; however, each of them has limits to its application.

12. Concentration enables the management to follow more closely the work of the gangs. It soon loses its advantages, however, owing to the high cost of travelling and lodging when the gang becomes too large and works over such a wide area that the men can no longer return home at night. The social advantages of returning home at night are, however, extremely important.

13. Mechanisation gives a great increase in individual output, though the saving on the work as a whole is less. The saving decreases very rapidly when the amount of work to be done is small and when the traffic on the lines in question is considerable. It requires very careful predetermination of the work to be done to avoid useless operations.

14. The general application of the new methods will only be crowned with success when the managerial staff is so trained that it knows the possibilities and limitations of these methods as well as its role in the economies which must result from their application.

Mr. R. Lévi proposed that in *Summary 11*, the word « considérables » in the French text be replaced by the word « notables », the word « considérables » being considered too strong in French. No alteration in the English text is necessary.

He considered moreover that the combined *Summaries Nos. 11, 12, 13 and 14* should be re-drafted by reason of the modifications already included in *Summary No. 4*. He would like to formulate a condensed text showing the advantages of concentration and mechanisation.

Mr. Dobmaier agreed, and said that he would like it to be stressed that in order to appreciate the implications of mechanisation, account should be taken of the composition and the condition of the component parts of the track.

Mr. Swartling *(Swedish State Railways)* considered that in *Summary No. 13* it was open to question to say that « the saving on the work as a whole is less ».

Mr. R. Lévi suggested a revised composite text of *Summaries Nos. 11, 12, 13* and *14*. These were read in French and English.

Mr. Smith proposed the phrase in the English text « composition of the track » instead of « *constitution of the track* ».

Mr. Julien presumed that the new *Summary No. 15* envisaged particularly the use of long welded rails.

Mr. Feyrabend replied that this text took into account fully, future techniques in the composition of the track.

Mr. SOOD referring to the proposed draft of *Summary No. 15* stated that in India it was practically impossible for the Operating staff to provide level crossing keepers, as the distance between stations was too great.

With regard to the new *Summary No. 14*, Mr. SMITH asked for a clearer definition in the English text of the phrase « managerial staff ».

The PRESIDENT agreed after discussion with Mr. FEYRABEND to use the words « *administrative staff* ».

Following the above discussion, the PRESIDENT proposed that the Section should finally discuss the new texts proposed for *Summaries Nos. 13 —15* at the final Sectional meeting, the re-draft of which is as follows :

Summary 13. — « The factors in the evolution of maintenance : concentration of gangs, organisation of work and mechanisation, are capable of yielding considerable economies as compared with present methods. Nevertheless :

« the economic advantages of concentration decrease when high cost is involved in the transport or lodging of a gang when the area is greater than can be covered by the men on foot;

« if mechanisation involves an increase in individual production, the total reduction of costs is less; it decreases rapidly with the amount of work in hand, and when the traffic on the lines involved is considerable. »

Summary 14. — « The general application of the new methods will only be crowned with success when the administrative staff fully understand the possibilities and limitations of these methods and how to take full advantage of the economies which it is hoped will result from their application.

Summary 15. — « The replies received from the various Administrations cover all the methods applied to standard track maintenance.

« Present progress in the technique of the composition of the track (elimination of joints), and with regard to the material used (notably increase in the life of sleepers) will allow, if present hopes are realised, of effecting a considerable reduction in recurring items of maintenance. The labour strength necessary for maintenance work proper will certainly be reduced and new composition of length gangs will need to be studied.

« The question of extraneous duties (inspection and obligations in connection with level crossings in particular) should form the subject of special study because it will become increasingly impossible to burden length gangs with such work if their output is not to be affected. »

It is mentioned that when the new Summaries are agreed, it will be necessary to revise the numbering of these to take into account the modifications

(The new numbers refer in particular to the alterations of the Summaries Nos 4 (i), *4* (ii), *4* (iii) *and 4* (iv), *changed in Nos. 5, 6 and 7, the former Summary No. 5 becoming therefore new No. 8.)*

— The session was closed at 11.45 a.m.

Meeting held on the 24th May, 1954.

The session started with the examination of the Summaries adopted during the previous meeting.

A discussion in which took part the following delegates : Messrs. Maunder *(Ministry of Transport and Civil Aviation, Great Britain)*, Queron, Feyrabend *(Reporter)* and Ratter *(British Railways)*, on the subject of the texts appearing in the records for the session held on May 21.

Agreement was then reached on the following drafts of the summaries of Question 1, which the President said were approved :

SUMMARIES.

« 1. The maintenance work of the « length gangs varies in different Railway « systems according to circumstances « such as climate, density of population, « wages, social and economic conditions, « cost of materials, living standards, etc.

« 2. Up to the last year or two, length « gangs were generally organised in small « gangs (at least six men) responsible for « all maintenance work on the length in « question (inspections, maintenance work « proper, as for instance levelling, lining, « gauging, weedkilling, etc.) and various « other work of local character, such as « relief of permanent level crossing keep- « ers.

« The burden arising from these tasks, « as well as lodging difficulties and trans- « port of personnel, make it difficult for « the Administrations to realise a reduc- « tion in the manpower employed in day- « to-day track maintenance.

« 3. Railway Administrations endea- « vour to reduce to a minimum track « maintenance costs with due consider- « ation to the necessity of carrying a « constantly increasing weight and speed « of traffic in comfort and security.

« 4. Especially in countries where in- « creasing wages have made it necessary « to get the very most out of the man- « power, trials have successfully been « undertaken in which the following two « fundamental tendencies appear :

« *a)* the search for an improvement in « overall productivity by the concentra- « tion of personnel in longer gang lengths « with a strength of at least 8 men, or « by the use of mobile gangs in con- « junction with reduced local gangs.

« *(b)* the search for an improvement « in individual productivity by the use of « motorised tools which allow of the « same individual carrying out more « easily some more important works.

« 5. The solutions agreed should allow « of :

« *(a)* the reduction in the overall num- « ber of gangers and a better organisation « of the work;

« *(b)* a greater continuity and more « clearly defined tasks allotted to each « ganger;

« *(c)* the production of more uniform « and probably more durable work;

« *(d)* the carrying out of relatively « important track work may fall within « the scope of private enterprise.

« 6. The economic and density of po- « pulation factors have an important « influence on the predominance accorded « to one or the other of the tendencies in « the solutions applied : each of them

« having, moreover, its limits of applic- « ation. The same factors can tend to « increase or reduce that part of the work « let to contract.

« 7. Concentration allows the manage- « ment to follow more closely the work « carried out by the gang. On the other « hand, the social advantages of personnel « returning each evening to their homes « should not be overlooked. This is a « question to which the men, in general, « attach great importance.

« Mechanisation is already largely « applied to major renewals in connection « with which the question no longer arises. « For the smaller works of day to day « maintenance its application should be « more carefully considered. It necessit- « ates a very precise appreciation of the « works to be done in order to avoid « unnecessary operations.

« To get the best result from the use « of mechanical tools supervisors and « operators must be well trained in their « use and daily maintenance.

« 8. The determination of the mainten- « ance works to be done has for many « years generally been based on :

« *(a)* the experience of the durability « of the work under the local conditions « involved (predetermined cycles). This « depends partially on an estimate and « can vary much from place to place;

« *(b)* the very careful examination in « the field of the track (systematic sur- « veys). These surveys are complicated « and take much time;

« *(c)* the appearance of trouble in the « track.

« 9. *(a)* After recognising the insuffi- « ciency of the «stitch in time » method « for assuring the proper condition of « permanent way because when work is « put in hand the faults may well have « reached a stage where they are irrepar- « able, some systems have adopted a « general method of overhaul applicable « to the whole of the system which is too « onerous.

« *(b)* The introduction of methodical « maintenance covering a periodic general « overhaul and a limited overhaul to deal « with level, especially at the joints, and « tightening up the fastenings, has resulted « in savings, especially from the labour « point of view.

« *(c)* The necessity for maintenance « operations is no longer based on a « simple estimate of the actual condition « of the track, but chiefly on an estimate « of the probable rate at which it will « wear.

« There will be important savings due « to the reduced mileage to be dealt with, « a better definition of the elementary « work, and a reduction in the number « of immediate overhauls.

« 10. Recording vehicles, particularly « those which give the position of each « rail in the vertical and horizontal planes « and the gauge, give invaluable services « from this point of view, with regard to « the factors to which they are sensitive. « By the comparison of successive record- « ings they make it possible to follow the « evolution of the condition of a given « line.

« The use of recording vehicles is of « very great economical value, because it « permits the maintenance work to be

« done exactly on the right spot and just « at the right moment, with consideration « to the track standard of the entire rail- « way system.

« 11. It should be recalled that this « question has already been considered « in Summary No. 5 *(a)*, of Question 1, « of the Enlarged Permanent Commission « which met at Lisbon on June 4, 1949, « in the following form :

« The maximum output of mechanis- « ed equipment for cleaning and « screening the ballast, and the removal « and replacement of the track, is « obtained when it is possible to take « advantage in long gaps in the running « of trains. This practice allows of a « speeding up of relaying operations, « of a reduction in the delay in carrying « them out in one section of track, in « short, to reduce the expense of all « services and particularly the expense « of slowing up traffic. »

« It is particularly important that the « planning of permanent way renewals « should be made in full agreement with « the Operating Department.

« 12. The final summaries adopted at « the Enlarged Meeting of the Permanent « Commission (Lisbon, June, 1949) men- « tion the paths for the movement of the « men and machines as follows :

« It is desirable in future in the case « of new railway construction or when « modifying existing lines to provide « large cesses to facilitate the use of « mechanical equipment and generating « plant.

« Besides this, the existence of such « paths is also very desirable for the « safety of the men, because in a large « measure they reduce the movement « of men to and from their place of « work on the track.

« It is equally desirable to maintain the « continuity of the « side paths » when « electrification is being carried out.

« 13. The factors in the evolution of « maintenance : concentration of gangs, « organisation of works and mechanis- « ation, are capable of yielding consider- « able economies as compared with « present methods. Nevertheless -

« the economic advantages of con- « centration decrease when high cost « is involved in the transport or lodging « of a gang when the area is greater « than can be covered by the men on « foot;

« the potential economies of mechan- « isation fall when the volume of work « is small, or when traffic is consider- « able.

« 14. The general application of the « new methods will only be crowned with « success when the administrative staff « fully understand the possibilities and « limitations of these methods and how « to take full advantage of the economies « which it is hoped will result from their « application.

« 15. The replies received from the « various Administrations cover all the « methods applied to standard track « maintenance.

« Present progress in the technique of « the composition of the track (elimin- « ation of joints), and with regard to the « material used (notably an increase in « the life of sleepers) will allow, if present

« hopes are realised, of effecting a con-
« siderable reduction in recurring items
« of maintenance. The labour strength
« necessary for maintenance work proper
« will certainly be reduced and new com-
« position of length gangs will need to
« be studied.

« The question of extraneous duties
« (inspection and obligations in connec-
« tion with level crossings in particular)
« should form the subject of thorough
« investigation because it will become
« increasingly impossible to burden length
« gangs with such work if their output
« is not to be affected. »

— These Summaries were ratified by the Plenary Meeting on May 25.

QUESTION 2.

A. Modernisation of station buildings and methods employed in financing modernisation projects.

B. Standardisation of unit construction applied to railway buildings.

Preliminary documents.

Report (America (North and South), Australia (Commonwealth of), Burma, Ceylon, Denmark, Egypt, Finland, India, Indonesia, Irak, Iran, Republic of Ireland, New Zealand, Norway, Pakistan, South Africa, Sweden and the United Kingdom of Great Britain and Northern Ireland and the territories for whose international relations the United Kingdom is responsible), by Dr. F. F. C. CURTIS. (See *Bulletin* for November 1953, p. 831, or separate issue No. 9.)

Report (Austria, Belgium and Colony, Bulgaria, Czechoslovakia, France and French Union, Germany, Greece, Hungary, Italy, Luxemburg, Netherlands, Portugal and Colonies, Rumania, Spain, Switzerland, Syria, Turkey and Yugoslavia), by José CHEDAS BOGARIM. (See *Bulletin* for December 1953, p. 935, or separate issue No. 13.)

Special Reporter : Dr. F. F. C. CURTIS. (See *Bulletin* for May 1954, p. 511.)

Report of Section I.

(See the *Congress Daily Journal, No. 4*, pp. 3/5; No. 5, pp. 1/2 and No. 6, p. 4.)

Meeting held on the 24th May, 1954.

The PRESIDENT called upon Mr. DUBUS, *Principal Secretary*, to read out the Summaries of the special report drafted by Dr. F. F. C. CURTIS.

Part «A»

Modernisation of station buildings and methods employed in financing modernisation projects.

Summary No. 1 :

1. A number of Administrations operating important railway systems base their modernisation projects on statistics of the anticipated volume of traffic and revenue therefrom. Others, mainly smaller ones, regard the traffic requirements alone as sufficient justification.

M. CALIENDO *(Italian State Railways)* gave some interesting explanatory remarks of a general character covering Summaries *Nos. 1* and *2*.

After a discussion in which the following delegates took part: Mr. SOOD *(Indian Government Railways)*, Mr. RATTER *(British Railways)*, M. BOUCIQUÉ *(Société Nationale des Chemins de fer Belges)*, Mr. VENKATARAMAYYA *(Indian Government Railways)* and Dr. CURTIS, *Special Reporter*, the PRESIDENT decided to appoint a sub-committee in order to redraft the text in accordance with the points raised.

This sub-committee, composed of Dr. CURTIS, Messrs. CALIENDO, PEIRANI *(French National Railways)*, SWARTLING

(Swedish State Railways), and DUBUS, *Principal Secretary*, will submit to the Section during the Session of May 25, the following draft :

« 1. A number of Administrations operating important railway systems take into account in their modernisation projects statistics of the anticipated volume of traffic and revenue therefrom. Other Administrations consider that certain factors should not be overlooked, such as :

« — the necessity to cater for the requirements of present day traffic;

« — the necessity to cater for the requirements of estimated future traffic;

« — the possibility of realising economies in maintenance and operating costs by means of improved planning of station amenities;

« — the necessity of making alterations to buildings following alterations in the general layout of the station. »

Summary No. 2 :

2. In minor works, replacement, maintenance and repairs are generally charged to revenue, improvements to capital account.

The new wording suggested by the sub-committee in the following :

« 2. In modernisation works, renewals, maintenance and repairs, are in general charged to revenue. »

— This new wording and the new text for *Summary 1* will be submitted to the approval of the Section during the next session.

Summary No. 3 :

3. Very large projects are always carried out in stages, each financed separately. Wherever possible, expenditure is met from revenue, working capital or renewal and depreciation reserves, though some administrations employ loan capital.

After remarks by Mr. MAUNDER *(Ministry of Transport and Civil Aviation, Great Britain)* and Mr. PEIRANI, this summary was agreed in the following terms :

« 3. Very large projects are often carried out in stages, each financed separately. Wherever possible, expenditure is met from revenue, working capital or renewal and depreciation reserves; when possible some administrations employ loan capital. »

Summary No. 4 :

4. The annual maintenance and renewal liabilities are in some cases calculated on a uniform basis for all types of construction, but some administrations differentiate between buildings with a long expectation of life and those of a more temporary construction.

— Agreed without discussion.

Summary No. 5 :

5. Most Administrations take into account the earnings from ancillary services, but, except at large stations, the amounts involved are not of great importance. Nevertheless, there is much to be said for exploiting to the fullest extent the possibilities of earning from shops, restaurants, hotels, advertising display, etc. A considerable portion of the money needed for station reconstruction can, in favourable circumstances, come out of revenue from ancillary services, or from capital contributions made by tenants.

Mr. LOHMANN *(Netherlands Railways)* and Mr. PEIRANI suggested some amendments in the text, in accordance with the following draft :

« 5. Some Administrations take into account the earning from ancillary ser-

vices, but, except at large stations, the amounts involved are not of great importance. Nevertheless, there is much to be said for exploiting to the fullest extent the possibilities of earnings from shops, restaurants, hotels, advertising display, etc. In some cases a portion of the money needed for station reconstruction can come out of revenue from ancillary services, or from capital contributions made by tenants. »

— Agreed.

Summary No. 6 :

6. Contributions towards station reconstruction projects from local authorities are limited in extent, except where work is carried out directly for their benefit. Only rarely has local pride, allied to commercial instinct, seized the opportunities offered in making a railway station a civic building.

M. CALIENDO suggested that the words « public authorities » should be used instead of « local authorities. »

M. QUERON *(French National Railways)* remarked that account should also be taken of certain public bodies, such as Chambers of Commerce.

M. SWARTLING would like to see comment made on the use of stations as commercial centres, and as points of liaison between rail and road and rail and air.

This question was considered by the sub-committee appointed to re-draft *Summary No. 1.* The following draft will be put to the Section during the session to be held on May 25 :

« 6. The contributions from public authorities and local bodies to station reconstruction schemes are of limited extent, except when the work is carried out directly for their benefit. Only rarely has local pride, allied to commercial instinct, seized the opportunities offered in making a railway station a civic building. »

« The use of station buildings as commercial centres and as connecting points with local bus lines should be studied in collaboration with other interested parties. In big cities this also applies to the utilisation of station buildings as terminals for airports, and, possibly also the use of stations as landing sites for helicopters when the technical requirements are better understood. »

Summary No. 7 :

7. In the planning stages of reconstruction schemes the general practice is to try to make economies by taking advantage of the most up-to-date equipment and methods of working. It is most important that the designers and the using departments work in the closest co-operation in order to obtain the fullest benefits from saving in personnel and improved working.

— Agreed, without discussion.

Part «B»

Standardisation of unit construction applied to railway building.

Summary No. 1 :

1. For railway purposes, standardised unit construction appears to be the answer to a need for temporary structures which can be quickly built, quickly removed and easily enlarged or adapted. Its use has, on the whole, been limited to buildings of an industrial character, such as locomotive sheds, goods depots and to various types of small buildings such as lengthmen's huts, shelters and small stores.

To take into account the observations of Mr. Ratter, Mr. Peirani and Mr Venkataramayya, the text was agreed in the following form :

« 1. For railway purposes standardised unit construction appears to be the answer to a need for simple structures which can be quickly and economically built, easily dismantled, and easily enlarged or adapted. Its use has, on the whole, been limited to buildings of an industrial character, such as locomotive sheds, goods depots, platform shelters, and to various types of small buildings such as lengthmen's huts, shelters, and small stores. »

Summaries Nos 2 and 3 :

2. For station buildings generally and for non-industrial buildings the character of the countryside, climatic conditions and local customs are taken into account. Such buildings must not become discordant factors in their surroundings and nearly always need to be specially designed.

3. It appears to be the general view that, at least as far as initial cost and rapidity of construction are concerned, standardised unit construction systems have advantages, but the greatest advantage from standardisation in buildings has been gained from the use of standard components especially those in general use in the building trade, standard fittings and equipment.

Mr. Queron observed that *Summary No. 3* followed logically *Summary No. 1* and suggested that *Summaries Nos. 2 and 3* be transposed.

Mr. Peirani suggested that the word « type » in the French text should be used instead of the word « standard ». (No alteration in the English text is necessary.)

These Summaries were adopted as follows :

« 2. It appears to be the general view that, at least as far as initial cost and rapidity of construction are concerned, standardised unit construction systems have advantages, but the greatest advantage from standardisation in buildings has been gained from the use of standard components, especially those in general use in the building trade, standard fittings and equipment. »

« 3. For station buildings generally and for non-industrial buildings the character of the countryside, climatic conditions and local customs are taken into account. Such buildings must not become discordant factors in their surroundings and nearly always need to be specially designed. »

Summary No. 4 :

4. It is unlikely that technical developments in the building industry will outstrip the progress of prefabrication systems.

Mr. Julien *(Ministère des Travaux Publics et des Transports, France)* stated that this summary should be re-drafted for the purpose of clarification. After discussion between Dr. Curtis and Mr. Peirani the following text was agreed :

« 4. It is likely that technical developments in the building industry will keep step with the progress of prefabrication systems. »

Summary No. 5 :

5. The application of standardised unit construction does not need to destroy initiative among technical staffs since standards must be constantly under review.

M. SWARTLING was afraid that the phrase « ...must be constantly under review » was too strong. The PRESIDENT suggested that the word « constantly » should be omitted, and supported by Mr. RATTER and M. PEIRANI, he proposed that the summary be completed as follows :

« 5. The application of standard unit construction does not need to destroy initiative among technical staffs since standards must be reviewed at due intervals.

« Standardisation is also important in that it effects economy in the time employed in the design of structures. »

— The *Summary* was agreed in this form.

The PRESIDENT then declared the session closed.

Meeting held on the 25th May, 1954.

The Session was opened at 9.0 a.m. under the presidency of Mr. J. C. L. TRAIN.

The PRESIDENT asked Mr. DUBUS, *Principal Secretary*, to read out *Summaries Nos. 1 and 2* of « Part A », re-drafted by the Sub-Committee and to submit to the Section (2nd reading), the remainder of the texts already adopted during the discussions.

Part «A»

Modernisation of station buildings and methods employed in financing modernisation projects.

Summary No. 1 :

The draft as proposed by the sub-committee was discussed, and was agreed, with a slight modification in the French text proposed by M. PIERANI.

The final text is given hereafter :

« 1. A number of Administrations operating important railway systems take into account in their modernisation projects statistics of the anticipated volume of traffic and revenue therefrom. Other Administrations consider that certain factors should not be overlooked, such as :

« the necessity to cater for the requirements of present day traffic;

« the necessity to cater for the requirements of estimated future traffic;

« the possibility of realising economies in maintenance and operating costs by means of improved planning of station amenities;

« the necessity of making alterations to buildings following alterations in the general layout of the station. »

Summary No. 2 :

The text shown page 895 was agreed without discussion.

Summary No. 3 :

M. JULIEN remarked that in France, the State was responsible for a portion of the expenses incurred in connection with the permanent way, and that this was not included in the items to be considered.

The PRESIDENT and Mr. QUERON suggested a re-drafting taking this into consideration.

The text modified as given hereafter was adopted :

« 3. Very large projects are often carried

out in stages, each financed separately. Wherever possible, expenditure is met from revenue, working capital or renewal and depreciation reserves; when possible some Administrations employ loan capital. »

Summary No. 4 :

— Agreed without discussion.

Summary No. 5 :

— Agreed without discussion.

Summary No. 6 :

The Section examined the proposed text drawn up by the sub-committee, appearing in the account of the proceedings of May 24.

Messrs. Queron, Renda and Peirani proposed various alterations which were agreed by the Section.

— The following re-drafted text was agreed.

« 6. The contributions from public authorities and local bodies to station reconstruction or alteration schemes are of limited extent, except when the work is carried out directly for their benefit. Only rarely has local pride, allied to commercial instinct, seized the opportunities offered in making a railway station a civic building.

« It is desirable that the use of station buildings as commercial centres and as connecting points with local bus lines should be studied in collaboration with other interested parties. In big cities this also applies to the utilisation of station buildings as terminals for airports, and, possibly, also the use of stations as landing sites for helicopters when the technical requirements are better understood. »

Summary No. 7 :

— Agreed without discussion.

Part «B»

Standardisation of unit construction applied to railway building.

The text of the *Summaries Nos. 1 to 5* adopted during the discussions were approved without modification.

The President expressed his satisfaction in the way in which Section I had carried out the work so expeditiously. He took the opportunity of thanking the Reporters and Special Reporter for the preparatory work they had put in, and he also thanked all those present for their support and helpful discussion. He also thanked the secretarial staff for their contribution to the work of the Section.

Mr. Julien expressed to Mr. Train the appreciation of the delegates of the way in which he had conducted the discussions.

— The complete text of the Summaries adopted is the following:

SUMMARIES.

A. Modernisation of station buildings and methods employed in financing modernisation projects.

« 1. A number of Administrations oper-
« ating important railway systems take into

« account in their modernisation projects « statistics of the anticipated volume of « traffic and revenue therefrom. Other « Administrations consider that certain « factors should not be overlooked, such « as :

« the necessity to cater for the require- « ments of present day traffic;

« the necessity to cater for the « requirements of estimated future traf- « fic;

« the possibility of realising econo- « mies in maintenance and operating « costs by means of improved planning « of station amenities;

« the necessity of making alterations « to buildings following alterations in « the general layout of the station.

« 2. In modernisation works, renewals, « maintenance and repairs, are in general « charged to revenue.

« 3. Very large projects are often carried « out in stages, each financed separately. « Wherever possible, expenditure is met « from revenue, working capital or renew- « al and depreciation reserves; when « possible some Administrations employ « loan capital.

« 4. The annual maintenance and « renewal are in some cases calculated « on a uniform basis for all types of con- « struction, but some Administrations « differentiate between buildings with a « long expectation of life and those of a « more temporary construction.

« 5. Some Administrations take into « account the earnings from ancillary « services, but, except at large stations, « the amounts involved are not of great « importance. Nevertheless, there is « much to be said for exploiting to the « fullest extent the possibilities of earn- « ings from shops, restaurants, hotels, « advertising display, etc. In some cases « a portion of the money needed for « station reconstruction can come out of « revenue from ancillary services, or from « capital contributions made by tenants.

« 6. The contributions from public « authorities and local bodies to station « reconstruction or alteration schemes « are of limited extent, except when the « work is carried out directly for their « benefit. Only rarely has local pride, « allied to commercial instinct, seized the « opportunities offered in making a rail- « way station a civic building.

« It is desirable that the use of station « buildings as commercial centres and as « connecting points with local bus lines « should be studied in collaboration with « other interested parties. In big cities « this also applies to the utilisation of « station buildings as terminals for air- « ports, and, possibly, also the use of « stations as landing sites for helicopters « when the technical requirements are « better understood.

« 7. In the planning stages of recon- « struction schemes the general practice « is to try to make economies by taking « advantage of the most up-to-date equip- « ment and methods of working. It is « most important that the designers and « the using departments work in the « closest co-operation in order to obtain « the fullest benefits from saving in « personnel and improved working. »

B. Standardisation of unit construction applied to railway buildings.

« 1. For railway purposes standardised « unit construction appears to be the « answer to a need for simple structures « which can be quickly and economically « built, easely dismantled, and easily « enlarged or adapted. Its use has, on « the whole, been limited to buildings of « an industrial character, such as loco- « motive sheds, goods depots, platform « shelters, and to various types of small « buildings such as lengthmen's huts, « shelters, and small stores.

« 2. It appears to be the general view « that, at least as far as initial cost and « rapidity of construction are concerned, « standardised unit construction systems « have advantages, but the greatest advant- « age from standardisation in buildings « has been gained from the use of stand- « ard components, especially those in « general use in the building trade, « standard fittings and equipment.

« 3. For station buildings generally and « for non-industrial buildings the char- « acter of the countryside, climatic con- « ditions and local customs are taken into « account. Such buildings must not « become discordant factors in their « surroundings and nearly always need « to be specially designed.

« 4. It is likely that technical develop- « ments in the building industry will keep « step with the progress of prefabrication « systems.

« 5. The application of standard unit « construction does not need to destroy « initiative among technical staffs since « standards must be reviewed at due « intervals.

« Standardisation is also important in « that it effects economy in the time « employed in the design of structures. »

— The Plenary Meeting ratified these Summaries on the 26th May 1954.

SECTION II. — Locomotives and rolling stock.

President : J.M. GOURSAT.

Assistant : A. PARMANTIER.

Vice-Presidents : H.E. STOKKE, O. WICHSER, E.D.F. TERKELSEN.

Principal Secretary : E. UYTBORCK.

QUESTION 3.

Technical and economic investigation of the basic characteristics of electric traction systems now in use, with a view to decide whether, and to what extent, there are relevant reasons for preferring one system to another.

In particular, are there any reasons in regard to :

a) power supply;

b) overhead line and fixed track installations;

c) motive power units;

d) working and maintenance costs?

Preliminary documents.

Report (America (North and South), Australia (Commonwealth of), Burma, Ceylon, Denmark, Egypt, Finland, India, Indonesia, Irak, Iran, Republic of Ireland, New Zealand, Norway, Pakistan, South Africa, Sweden and the United Kingdom of Great Britain and Northern Ireland and the territories for whose international relations the United Kingdom is responsible), by S. B. WARDER. (See *Bulletin* for October 1953, p. 657, or separate issue No. 6.)

Report (Austria, Belgium and Colony, Bulguria, Czeschoslovakia, France and French Union, Germany, Greece, Hungary, Italy, Luxemburg, Netherlands, Poland, Portugal and Colonies, Rumania, Spain, Switzerland, Syria, Turkey, and Yugoslavia), by C. GUZZANTI. (See *Bulletin* for March 1954, p. 297, or separate issue No. 22.)

Special Reporter : S. B. WARDER. (See *Bulletin* for May 1954, p. 519.)

Report of Section II.

(See the *Congress Daily Journal*, No. 4, pp. 5/6; No. 5, pp. 2/4 and p. 9; No. 6, pp. 1/2 and 4.)

Meeting held on the 24th May, 1954.

The meeting was opened at 9.0 a.m. by Mr. PARMANTIER, deputising for Mr. GOURSAT.

The PRESIDENT thanked the Reporters and the Special Reporter, and called upon Mr. WARDER *(Special Reporter)* to read his summaries.

Summaries Nos. 1, 2 and 3 :

General.

1. The investigations of the Reporters show that for all practical purposes the only systems suitable for extensive railway application are :

Direct current, 1 500 V;

Direct current, 3 000 V;

Alternating current, low frequency at 11/16 kV;

Alternating current, standard frequency at about 25 kV.

2. Each of these systems has features in the technical, operational, and economical fields which make one or other of them particularly suitable in certain circumstances.

3. They, however, each possess certain less advantageous features which have to be taken into account when a choice of system has to be made.

— These Summaries were adopted without amendement.

Summary No. 4 :

Power supply.

4. The power supply system does not normally determine the choice of electrification system as all can be arranged for supply from systems feeding other loads.

M. GARREAU (*French National Railways*) proposed the following revised text :

« The power supply system does not normally determine the choice of electrification system. It is desirable that the sources of electrical energy and the high voltage feeders for electric traction should be those of the general system which also supplies other consumers; this condition is fulfilled with the D.C. system and the single phase industrial frequency system. It can also be fulfilled with the single phase, low frequency, system if the substations are equipped with frequency-converters. »

Mr. WARDER, *Special Reporter*, preferred the retention of his original text, as the proposal would not be readily accepted by Administrations having their own power stations.

After a further amendment proposed by Mr. GARREAU, Messrs. CUTTICA *(Italian State Railway)*, GUZZANTI *(Reporter)*, D'ARBELA *(Italian State Railways)* and Mr. GERBER *(Swiss Federal Railways)* stated that they shared the view of the *Special Reporter*, and preferred that the original text should be maintained.

— *Summary No. 4* was finally adopted without amendment.

Summary No. 5 :

5. However, this enquiry has shown that there is a wide disparity of tariffs and further study of these and of the possibility of special rates being given to the railways is recommended.

At the request of Mr. KOSTER *(Netherlands Railways)* the SPECIAL REPORTER explained his point of view on the necessity for railway systems obtaining special rates.

Mr. CONWAY *(British Government)* supported the opinions expressed by the *Special Reporter;* as railway electrification improves the efficiency of power stations, it will allow tariffs to be reduced.

Mr. BAEYENS *(Belgian National Railways)* proposed that « special rates » should be replaced by « more favourable rates ».

Mr. GARREAU proposed that the reasons for seeking more favourable rates should be explained, particularly with regard to demand at « off-peak » periods.

The meeting agreed that *Summary No. 5* should be amplified and the final text thus becomes :

« 5. However, this enquiry has shown

that there is a wide disparity of tariffs and further study of these and of the possibility of more favourable rates being given to the railways is recommended, especially in view of the fact that the supply systems benefit by the supply of large amounts of power at « off-peak » hours. »

Summary No. 6 :

Fixed installations.

a) **Substations.**

6. D.C. systems require a greater number and sometimes more complicated substations than are required from A.C. systems.

M. GARREAU proposed a text setting out that D.C. sub-stations are simpler than sub-stations requiring frequency conversion, but are more complicated than single phase transformer sub-stations.

Mr. GERBER expressed the opinion that the complication and cost of the first two types are similar.

The Italian, Belgian and Netherlands delegates declared themselves in favour of maintaining the original text and this was then *adopted.*

Summary No. 7 :

7. Of the two A.C. systems the standard frequency system permits the simpler substation, because frequency converters are not required.

Mr. GERBER wished to see the word « because » replaced by « when ».

Mr. GARREAU suggested that the subtitles « *a*) Sub-stations » and « *b*) Overhead contact lines » should be deleted from the section on « Fixed Installations. »

Mr. RECK *(International Union of Railways)* proposed that the expression « sub-stations » should be replaced by « fixed installations ».

After a discussion in which Messrs. KARSBERG *(Swedish State Railways)*, READ *(New Zealand Government Railways)*, KOSTER, D'ARBELA, BAEYENS and GONWAY took part, Mr. GARREAU agreed to the following text :

« 7. Of the A.C. systems, the standard frequency system permits the simplest fixed installations because frequency converters or special lines and low frequency power stations are not required. »

Summary No. 8 :

8. Until more evidence is available, it must be feared that this simplicity is accompanied by the inconvenience due to the reaction of unbalancing effects on the power supply and certain restrictions on the possibility of affording parallel supplies to sections of the railway.

— Adopted as written.

Summary No. 9 :

b) **Overhead contact lines.**

9. The A.C. systems permit the use of smaller cross sections in the contact system than are needed for the D.C. systems; after allowance has been made for the difference in line voltage, the substation spacing, the average and maximum values of drop of voltage are of the same order for A.C. systems.

Summary No. 9 was adopted, subject to a slight modification to make the English and French texts agree :

« 9. The A.C. systems permit the use of smaller cross sections in the contact system than are needed for the D.C.

systems; after allowance has been made for the difference in line voltage, the substation spacing, the average and maximum values of drop of voltage are of the same order for the two A.C. systems. »

Summary No. 10 :

10. The lower weight of the contact line permits a reduction in the strength of the supporting structures and their foundations, but on account of restrictions imposed by wind forces and track curvature, the spacing between structures is of the same order for all systems.

— *Summary No. 10* was adopted without amendment.

Summary No. 11 :

11. There are wide diversities in the amount of clearance reported necessary on the various systems in different countries, probably due to the climate, amount of steam traffic and perhaps to a different method of defining the clearances. A standard method of defining the clearances should be used.

Mr. R. Lévi *(French National Railways)* stated that the wide diversity in the replies received appeared to arise from the lack of adequate methods of defining the clearances. He suggested that mention should be made of the problem of flashover in tunnels subjects to smoke.

Messrs. Guzzanti and d'Arbela stated that climatic conditions are as important as those encoutered in smokey tunnels.

At the request of Mr. Swift *(British Railways)*, it was explained that this summary referred to clearances both in free air and the distances over insulators.

On the proposal of Mr. Lévi, the following text was adopted :

« 11. There are wide diversities in the amount of clearance reported necessary on the various systems in different countries, perhaps because of climatic conditions and, in particular, because certain Administrations consider it necessary to provide a large margin of security.

« Further tests should be made to determine the clearances necessary under the various conditions which arise in service. »

Summaries Nos. 12 and 13 :

12. The advantages of the light weight overhead systems are most pronounced on railways of simple formation in open country and are of less importance in built-up areas with multiple tracks, many junctions and difficulty in obtaining necessary clearances.

13. Satisfactory overhead contact systems can be built for all the systems.

— These two Summaries were adopted without modifications.

The Meeting closed at 12 noon.

Meeting held on the 25th May, 1954.

The Meeting was opened at 9 a.m. by Mr. Parmantier deputising for Mr. Goursat.

The Section started the examination of the Chapter : « Motive power units ».

Summaries Nos. 14 and 15 :

Motive power units.

14. There is a marked trend towards the total adhesion type of locomotive, usually with bogie mounted motors, for all systems.

15. Differences in the method of rating and the type of service preclude the possibility of exact comparison between the characteristics of locomotives working on one system of electrification with those of another.

— These Summaries were adopted without amendment.

Summary No. 16 :

16. Satisfactory locomotives for freight, passenger and mixed traffic have been built for all systems and there has been a steady improvement in the quality of performance of locomotives of all types.

Mr. NOUVION *(French National Railways)* proposed a modified text to take into account the present possibility of building locomotives suitable for all requirements :

« Taking into account the operating methods adopted in the various countries, satisfactory locomotive for freight, passenger and mixed traffic have been built for all the various systems of electrification and there has been a steady improvement in the quality of performance of locomotives of all types. It is now possible in all systems to build total adhesion locomotives suitable for all types of service. »

After a discussion in which the PRESIDENT, Mr. WARDER, *Special Reporter*, Messrs. ZATTONI *(Italian State Railways)*, GARREAU *(French National Railways)*, BULLEID *(Coras Iompair Eireann, Ireland)*, and GERBER *(Swiss Federal Railways)* took part, *Summary No. 16* was eventually adopted as follows :

« 16. Satisfactory locomotives for freight passenger and mixed traffic have been built for all systems and there has been a steady improvement in the quality of performance of locomotives of all types.

« It is now possible, with all systems, to construct locomotives suitable for all services. »

Summary No. 17 :

17. Locomotives of each system have certain characteristic advantages and disadvantages.

Mr. GERBER proposed the elimination of the words « and disadvantages ». It appeared that all locomotives did, in fact, give satisfaction in the services they were required to fulfil.

The PRESIDENT proposed, and the delegates present agreed, that this *Summary could be deleted.*

Summary No. 18 (new No. 17) :

18. The advent of the 50-cycle system has led to a re-evaluation of the characteristics required of an electric locomotive and has resulted in several new and interesting types being built by the S.N.C.F. for the Thionville-Valenciennes line. These types have great promise of overcoming the traditional difficulty of bad commutation with normal frequency A.C. series motors. Some of these types seem to avoid the additional weight and expense formerly thought to be essential to overcome the difficulties.

Final judgment should, however, be deferred until sufficient operating experience has been obtained.

Locomotives converting A.C. to D.C. hold out prospects of simplifying interrunning between railways electrified on different systems.

Mr. D'ARBELA proposed the inclusion in this summary of a statement with regard to existing locomotives incorporating rotary or static converters.

Mr. NOUVION suggested that the Summary should not be restricted to the present experiences on the French National Railways, but should be extended to cover experience in Turkey, Hungary and the Belgian Congo.

On the proposal of the PRESIDENT and Mr. GARREAU, the following text was adopted :

« 17. The advent of the 50 cycle system

has led certain Administrations to build several interesting types of locomotives. Amongst these types, those which use the single phase commutator motor must be capable of overcoming the traditional difficulty of bad commutation inherent in this type of motor; others which include current conversion on the locomotive should provide new possibilities in the use of electric traction.

« Final judgment should, however, be deferred until sufficient operating experience has been obtained.

« Locomotives converting A.C. to D.C. hold out prospects of simplifying interunning between railways electrified on different systems. »

Summaries Nos. 19, 20, 21 and 22 (new Nos. : 18, 19, 20 and 21) :

19 *(new 18).* The multiple unit type of electric train is an important feature of most electrification schemes which cater for passenger traffic, ant it is considered that there is still further scope for its exploitation.

Economic investigation.

20 *(new 19).* The widely differing conditions which exist between countries make it impossible to place any great reliance on a direct comparison of the costs of their respective systems.

21 *(new 20).* As regards the comparison of first costs between different systems, the variations is not only very great as between different countries but is affected to a certain extent by the diversity in size and type of the respective systems.

22 *(new 21).* The information received regarding maintenance and operating costs has not permitted a conclusion about the effect of the system in use on these costs. This is probably because the size, type and age of the installations, particularly of the tractive units, which affect the maintenance cost very considerably, are so variable as to prevent an effective comparison being made.

— These Summaries were adopted without discussion.

Summary No. 23 (new No. 22) :

23. A great reduction in the first cost of the fixed equipment such as is often possible under favourable conditions for the standard frequency single phase A.C. system will favourably affect the possibility of electrifying lines which would not justify electrification on the other systems. This is a big factor in favour of the system, but a more accurate assessment of this advantage could be made if a common formula were devised for determining more realistic fixed charges for different items of equipment.

Mr. Karsberg *(Swedish State Railways)* would have liked the summary to deal with the whole of the costs involved (first cost of fixed equipment and first cost and maintenance of rolling stock).

Following contributions by Messrs. Renard *(Railways Economiques de Liège-Seraing et extensions, Belgium)* and Vaubourdolle *(French National Railways)* the following proposal by Mr. d'Arbela was approved :

« 22. A great reduction in the first cost of fixed equipment will favourably affect the possibility of electrifying lines which otherwise would not justify electrification.

« This would seem to be a big factor in favour of the 50 cycle single phase system, but a more accurate assessment of the advantages to be derived could be made only if a common formula were devised for determining more realistic fixed charges for different items of equipment. »

Summary No. 24 (new 23) :

24. How far this system could supersede other systems for the electrification of lines in which the cost of fixed installation is of less importance because of the greater number of the tractive units required, is still uncertain.

Mr. RENARD asked if the text of the summary implied that electric locomotives are more costly with one system than with another.

Mr. GUZZANTI replied that the summary was related to the size of the locomotive stock under each system and not to the cost of individual units.

Mr. BAEYENS proposed that the word « cost » should read « first cost. »

Mr. BULLEID pointed out that the French text omitted the comparative form from the expression « the greater number of tractive units ».

Mr. SWIFT expressed a wish for mention to be made of the differences in first cost between motive units of the different systems. A comparison between the costs of maintenance could not yet be established.

Mr. GARREAU proposed, in view of the observations made, the following text :

« The economic advantage of this system by comparison with others is greater, firstly when the first cost of fixed installations represents a higher proportion of the total cost of the electrification, and secondly when the number of motive units is lower. »

Mr. WARDER and Mr. D'ARBELA preferred that the original text should be retained.

Mr. KARSBERG stated that an effective comparison could be made only between two systems having the same tractive energy, the same number of motive units and the same speeds.

Mr. NOUVION stated that the French National Railway locomotives, type BB, 50 cycles, 80 tons, are at present the most powerful on the Continent, their cost is less than that of locomotives for 16 2/3 cycles. Further experience on the French National Railways will allow a firm comparison between the 50 cycle A.C. and the D.C. systems.

Mr. KARSBERG regretted that it had not been possible to establish any comparison between the two A.C. systems.

— The PRESIDENT closed the meeting at 11.0 a.m. to allow the delegates present to attend the Plenary Meeting.

Meeting held on the 26th May, 1954.

The meeting was opened at 9.0 a.m. by Mr. PARMANTIER deputising for Mr. GOURSAT.

The discussion of *Summary No. 24 (new No. 23)*, which had not been concluded at the previous meeting, was resumed by the PRESIDENT, who proposed a slight modification to the Special Reporter's original text.

To take account of the remarks made by Mr. KARSBERG ,the PRESIDENT suggested that an addition might be made to *Summary No. 21* of a paragraph, pointing out that the economic comparison between

the systems should, of course, take into account the purchase price of motive units.

Mr. Uytborck, *Principal Secretary*, considered that the addition of this text was superfluous.

Mr. Cuttica *(Italian State Railways)* agreed with Mr. Uytborck in view of the fact that the differences between locomotive costs under the various systems could not be defined.

The meeting agreed that *Summary No. 21* should not be amended, and the following text was adopted for *Summary No. 23 :*

« 23. It cannot be said at present at what point this system would be preferable to another for electrification of lines which demand a greater number of motive units and in which, therefore, the first cost of fixed installations have a relatively lower importance. »

Summary No. 25 (new No. 24) :

25. There seems to be insufficient information at present to confirm any definite superiority of any of the four main systems in all respects which would permit any one to be preferred over the others under conditions at present obtaining.

Mr. d'Arbela desired the words « information » and « confirm » replaced by the words « units » and « assert ».

Mr. Bayens pointed out that the insufficiency of information concerned one system only.

Mr. Porchez *(French National Railways)* suggested the use of « experience » rather than « information ». Moreover, the comparison in question was between a recent system and systems already tested; the 50 cycle system is from now on capable of competition with other systems, from the economic as well as the technical aspect.

In the United States, the « Battelle Institute », in its consideration of the replacement of Diesel traction by electric traction, decided in favour of the 60-cycle system. Orders for 60 cycle motive units have already been placed, the confidence of the French National Railways in the 50 cycle system is thus based on fact and is not hypothetical.

On the proposal of Mr. Garreau the Summary was adopted, as follows :

« 24. There seems to be insufficient experience at present with the 50 cycle system of electrification to assert a definite superiority of any of the four main systems in all respect which would permit any one to be preferred over the others under conditions at present obtaining. »

Summary No. 26 (new No. 25) :

26. The evidence at present available suggests that it is unlikely that in the foreseeable future one system will prove to be the best for all railways having regard to their very diverse characteristics.

Mr. Read suggested adding a statement that the 16 2/3rd cycle system will, in future, be used only where it exists at present.

Messrs. d'Arbela and Gerber were not in favour of so definite a statement.

After a discussion in which Messrs. Garreau, Baeyens and Warder, *Special Reporter*, took part, the delegates present

agreed that the text should be retained in its original form, as follows :

« 25. The evidence at present available suggests that it is unlikely that in the foreseeable future one system will prove to be the best for all railways having regard to their very diverse characteristics. »

Summary No. 27 (new No. 26) :

27. In any case, such superiority, wherever it exists, is unlikely to be sufficient to justify the cost of replacing an existing system of the other three types considered with the one having only a marginal advantage.

Mr. CONWAY considered that the text could encourage Administrations to retain an existing system even through there might be an opportunity of converting it.

Mr. ZATTONI stated that in Italy the three-phase system could be replaced by the D.C. system only with great difficulty. It would, therefore, be preferable to retain the Special Reporter's text.

The PRESIDENT, whilst appreciating Mr. CONWAY's remarks, agreed with the latter point of view.

Mr. VAUBOURDOLLE supported by Messrs. WARDER, CONWAY, CUTTICA and the PRESIDENT, proposed the deletion of the final part of the paragraph « of the other three types considered with the one having only a marginal advantage ».

Mr. DUCLUZEAU *(French National Railways)* pointed out that the question of the advantage of the system would disappear from the summary if it were presented in this way.

The PRESIDENT replied that the mention of « superiority » at the commencement of the sentence would imply an advantage.

Mr. D'ARBELA called the attention of the delegates present to the fact that the summary dealt primarily with a possible opportunity for replacing a system rather than with the technical superiority of one system over another.

Mr. BAEYENS agreed with Mr. D'ARBELA and emphasised that the cost of dismantling would reduce the amount of benefit to be gained from the new system.

The meeting finally adopted the proposal by Mr. VAUBOURDOLLE, the following text being approved :

« 26. In any case, such superiority, wherever it exists, is unlikely to be sufficient to justify the cost of replacing an existing system. »

Summary No. 28 (new No. 27) :

28. On most lines the choice between systems can only be made by detailed comparative estimates, taking all the special factors of the lines concerned into account.

— This Summary was adopted without amendment.

Mr. CONWAY, in a statement subsequent to the consideration of the Summaries, states that he would like to draw the attention of the Railway Administrations to a development which had been effected in Great Britain in connection with an agricultural tractor, by supplying three-phase current to a motor/hydraulic pump arrangement driving directly on the wheels. This arrangement would allow the elimination of gears from the transmission.

The President thanked the delegates and congratulated the Special Reporter and Reporters. He also mentioned that the Valenciennes-Thionville installation should come into operation in July 1954 and he would take this opportunity of inviting the technical experts present to see the trials of the new locomotives.

— The meeting closed at 10.15 a.m.

— The complete text of the Summaries adopted is as follows :

SUMMARIES.

General.

« 1. The investigations of the Reporters « show that for all practical purposes the « only systems suitable for extensive « railway application are :

« Direct Current, 1 500 V;

« Direct Current, 3 000 V;

« Alternating Current, low frequency at 11/16 kV;

« Alternating Current, standard frequency at about 25 kV.

« 2. Each of these systems has features « in the technical, operational, and economical fields which make one or other « of them particularly suitable in certain « circumstances.

« 3. They, however, each possess certain less advantageous features which « have to be taken into account when a « choice of system has to be made.

Power supply.

« 4. The power supply system does not « normally determine the choice of electrification system as all can be arranged « for supply from systems feeding other « loads.

« 5. However, this enquiry has shown « that there is a wide disparity of tariffs « and further study of these and of the « possibility of more favourable rates « being given to the railways is recommended especially in view of the fact « that the supply systems benefit by the « supply of large amounts of power at « « off-peak » hours.

Fixed installations.

a) *Substations.*

« 6. D.C. systems require a greater « number and sometimes more complicated substations than are required for « A.C. systems.

« 7. Of the A.C. systems, the standard « frequency system permits the simplest « fixed installations because frequency « converters or special lines and low « frequency power stations are not required.

« 8. Until more evidence is available, « it must be feared that this simplicity « is accompanied by the inconvenience « due to the reaction of unbalancing « effects on the power supply and certain « restrictions on the possibility of according parallel supplies to sections of the « railway.

(b) *Overhead contact lines.*

« 9. The A.C. systems permit the use « of smaller cross sections in the contact « system than are needed for the D.C. « systems; after allowance has been made « for the difference in line voltage, the

« sub-station spacing, the average and « maximum values of drop of voltage are « of the same order for the two A.C. « systems.

« 10. The lower weight of the contact « line permits a reduction in the strength « of the supporting structures and their « foundations, but on account of restric- « tions imposed by wind forces and track « curvature, the spacing between struc- « tures is of the same order for all « systems.

« 11. There are wide diversities in the « amount of clearance reported necessary « on the various systems in different « countries, perhaps because of climatic « conditions and, in particular, because « certain Administrations consider it ne- « cessary to provide a large margin of « security.

« Further tests should be made to « determine the clearances necessary un- « der the various conditions which arise « in service.

« 12. The advantages of the light « weight overhead systems are most « pronounced on railways of simple form- « ation in open country and are of less « importance in built-up areas with « multiple tracks, many junctions and « difficulty in obtaining necessary clear- « ances.

« 13. Satisfactory overhead contact « systems can be built for all the systems.

Motive power units.

« 14. There is a marked trend towards « the total adhesion type of locomotive, « usually with bogie mounted motors, for « all systems.

« 15. Differences in the method of « rating and the type of service preclude « the possibility of exact comparison « between the characteristics of locomo- « tives working on one system of elec- « trification with those of another.

« 16. Satisfactory locomotives for « freight passenger and mixed traffic have « been built for all systems and there has « been a steady improvement in the quality « of performance of locomotives of all « types.

« It is now possible, with all systems, « to construct locomotives suitable for « all services.

« 17. The advent of the 50 cycle « system has led certain Administrations « to build several interesting types of « locomotives. Amongst these types, « those which use the single phase com- « mutator motor must be capable of « overcoming the traditional difficulty « of bad commutation inherent in this « type of motor; others which include « current conversion on the locomotive « should provide new possibilities in the « use of electric traction.

« Final judgment should, however, be « deferred until sufficient operating exper- « ience has been obtained.

« Locomotives converting A.C. to D.C. « hold out prospects of simplifying inter- « running between railways electrified on « different systems.

« 18. The multiple unit type of electric « train is an important feature of most « electrification schemes which cater for « passenger traffic, and it is considered « that there is still further scope for its « exploitation.

Economic investigation.

« 19. The widely differing conditions « which exist between countries make it « impossible to place any great reliance « on a direct comparison of the costs of « their respective systems.

« 20. As regards the comparison of « first costs between different systems, the « variation is not only very great as « between different countries but is affect- « ed to a certain extent by the diversity « in size and type of the respective « systems.

« 21. The information received regard- « ing maintenance and operating costs « has not permitted a conclusion about « the effect of the system in use on these « costs. This is probably because the « size, type and age of the installations, « particularly of the tractive units, which « affect the maintenance cost very con- « siderably, are so variable as to prevent « an effective comparison being made.

« 22. A great reduction in the first cost « of fixed equipment will favourably « affect the possibility of electrifying lines « which otherwise would not justify elec- « trification. This would seem to be a « big factor in favour of the 50 cycle « single phase system, but a more accur- « ate assessment of the advantages to be « derived could be made only if a com- « mon formula were devised for deter- « mining more realistic fixed charges for « different items of equipment.

« 23. It cannot be said at present at « what point this system would be prefer- « able to another for electrification of « lines which demand a greater number « of motive units and in which, therefore, « the first cost of fixed installations have « a relatively lower importance.

« 24. There seems to be insufficient « experience at present with the 50 cycle « system of electrification to assert a « definite superiority of any of the four « main systems in all respects which « would permit any one to be preferred « over the others under conditions at « present obtaining.

« 25. The evidence at present available « suggests that it is unlikely that in the « foreseeable future one system will prove « to be the best for all railways having « regard to their very diverse charac- « teristics.

« 26. In any case, such superiority, « wherever it exists, is unlikely to be « sufficient to justify the cost of replacing « an existing system.

« 27. On most lines the choice between « systems can only be made by detailed « comparative estimates, taking all the « special factors of the lines concerned « into account. »

— The Plenary Meetings held respectively on the 25th and 26th May ratified these Summaries.

QUESTION 4.

Means and methods to improve the efficiency of steam locomotives :

a) increase of steam pressure,
b) types of grates,
c) superheating of the steam,
d) preheating of the feeding water,
e) feed water treatment, etc.

Preliminary documents.

Report (Austria, Belgium and Colony, Bulgaria, Czeschoslovakia, France and French

Union, Germany, Greece, Hungary, Italy, Luxemburg, Netherlands, Poland, Portugal and Colonies, Rumania, Spain, Switzerland, Syria, Turkey and Yugoslavia), by M. DIEGOLI. (See *Bulletin* for April 1954, p. 435, or separate issue No. 24.)

Report (America (North and South), Australia (Commonwealth of), Burma, Ceylon, Denmark, Egypt, Finland, India, Indonesia, Irak, Iran, Republic of Ireland, New Zealand, Norway, Pakistan, South Africa, Sweden and the United Kingdom of Great Britain and Northern Ireland and the territories for whose international relations the United Kingdom is responsible), by C. T. LONG. (See *Bulletins* for January 1954, p. 117; August 1954, p. 757, or separate issue No. 18.)

Special Reporter : R. SQUILBIN. (See *Bulletin* for May 1954, p. 528.)

Report of Section II.

(See the *Congress Daily Journal* No. 2, pp. 5/6; No. 3, pp. 4/5 and No. 5, p. 9.)

Meeting held on the 20th May, 1954.

— The Meeting was opened at 9 a.m. under the chairmanship of Mr. GOURSAT *President of the Section.*

The PRESIDENT called upon Mr. SQUILBIN, *Special Reporter*, who referred to a supplementary report compiled by Mr. LONG, *Reporter*, based on later replies to the questionnaire.

In the opinion of the Special Reporter, this supplementary report was not such as would call for any modification of the text of the Summaries which would be submitted for discussion.

The PRESIDENT then offered for discussion the text of the Summaries of the Special Report.

Summary No. 1 :

1. Steam traction is being progressively displaced by other types of traction and little new steam locomotive construction is now envisaged.

In view of the size of the stocks of steam locomotives which will have to remain in service for many years to come, the main aim of the Administrations is to reduce to a minimum the cost of operation and to increase the availability of engines by improvement and especially by simplication.

It would appear that in the search for a lower cost for a steam locomotive, there is more to be gained in the present state of steam locomotive technique by a reorganisation of the locomotive's service than by improvement of the engine.

The first paragraph was adopted without discussion.

On the proposal of Mr. DUCLUZEAU *(French National Railways)*, the second paragraph was amended by replacing the word « improvement » by the phrase « improved efficiency of performance ».

With regard to the third paragraph, Mr. COX *(British Railways)* considered that a reorganisation of the locomotive's service often implied some preliminary improvement in the locomotive itself.

Mr. INGLIS *(British Railways)* expressed the opinion that the existing text tended to minimise the importance of technical improvement.

Mr. BULLEID *(Coras Iompair Eireann, Ireland)* stated that in the English text the word « cost » should be replaced by « cost per mile ». He also considered that the Summary was outside the scope of the question.

The PRESIDENT suggested that at the present time everything which could be

considered as relevant to reduction in costs must be examined.

Mr. Read *(New Zealand Government Railways)* considered that it was necessary to give equal importance to technical improvement and to reorganisation of service.

Mr. Brouckaert *(Belgian National Railways)* proposed that improved organisation of the service should be mentioned separately from the improvements in maintenance.

The President then proposed that, taking into account the various suggestions which had been made, the text should be modified as follows :

« 1. Steam traction is being progressively displaced by other types of traction, and little new steam locomotive construction is now envisaged.

« In view of the size of the stock of steam locomotives which will have to remain in service for many years to come, the main aim of the Administrations is to reduce to a minimum the cost of operation and to increase the availability of engines by improved efficiency of performance and especially by simplification.

« It would appear that in the search for a lower operating cost for steam traction, in the present state of steam locomotive technique, particular attention should be paid, without any cessation of the search for technical improvement in the motive unit, to improving the organisation of the locomotive's service, (operation and maintenance). »

— This Summary was adopted by the Meeting.

Summary No. 2 :

2. The normal type of boiler has prevailed over all the special types previously envisaged.

To avoid any increased cost of maintenance, boiler pressure has generally been maintained at 16-18 kg/cm² (227-256 lbs per sq. in) and temperature of the superheat does not exceed 400° C.

Mr. Ducluzeau reported that the French National Railways were using, with success, a pressure of 20 Hpz on 4-8-2 type locomotives which had, from the time they were built, been given feed water treatment. It would, in fact, appear that first results might be better than with the 16/18 kg/cm² (227/256 lb. per sq. in.) locomotives with nickel steel boiler barrels.

Mr. Long, *Reporter*, pointed out that the Norfolk and Western Railway has a locomotive stock with a pressure of 21 kg/cm² (300 lb. per sq. in.) and that they are giving satisfactory results.

The President stated that increase in boiler pressure is related to question of quality and cost of steel as well as to difficulties of welding. He proposed that, to meet the remarks made by Mr. Ducluzeau and Mr. Long, the second paragraph should commence with the phrase : « In the opinion of the great majority of the Administrations ».

Mr. Da Cunha Da Costa *(Indian Government Railways)* mentioned that the Indian Railways intend to build locomotives with a pressure in excess of 20 kg/cm² (284 lb. per sq. in.).

The meeting then discussed whether « large majority » or simply « majority »

expressed the ideas of the delegates and the following text was eventually adopted for *Summary No. 2.*

« 2. Although certain Administrations have obtained satisfactory results, from the point of view of maintenance, with higher pressures, the majority of the Administrations consider that, to avoid any risk of increased cost of maintenance, boiler pressure should not exceed 18 kg/cm² and the temperature of the superheat should not exceed 400° C. »

Summary No. 3 :

3. Various types of grate (fixed or movable) are used on all locomotives. None of these types appears to be particularly outstanding.

— This Summary was adopted without modification.

Summary No. 4 :

4. Mechanical stoking is well developed for powerful locomotives having a grate area of more than 5 m² (53 sq. ft.). It is advisable in spite of the resultant expense. It also allows fuel to be used which is not very suitable for hand firing.

Oil firing has been extended, but its development depend mainly on the comparative economic market in fuel oil and coal.

The PRESIDENT having regard to the firing arrangements applied to the narrow fireboxes of some French National Railway locomotives suggested that the first paragraph should be amended as follows :

« Mechanical stoking is well developed for powerful locomotives, even for locomotives having a grate area of less than 5 m² (53 sq. ft.). It is advisable in spite of the resultant expense. It also allows fuel to be used which is not very suitable for hand firing. »

With regard to the second paragraph, the PRESIDENT stated that fuel-oil firing had in some cases been discontinued by certain Administrations for economic reasons.

Mr. CONWAY *(British Government)* referred to item *b*) paragraph B of the special report; he considered that the experiences which had been gained in various countries in the use of pulverised coal firing with stationary equipment could be applied to steam locomotives without any great difficulty.

The PRESIDENT pointed out that the use of pulverised coal on locomotives had not been confirmed by experience and he, therefore, did not think that the summary should be amended.

The second paragraph was then adopted without alteration, and the complete text is as follows :

« 4. Mechanical stocking is well developed for powerful locomotives, even for locomotives having a grate area of less than 5 m² (53 sq. ft.). It is advisable in spite of the resultant expense. It also allows fuel to be used which is not very suitable for hand firing.

« Oil firing has been extended but its development depends mainly on the comparative economic market in fuel oil and coal.

Summary No. 5 :

5. In spite of increased maintenance costs, feed water preheating is widely used.

Mixer type, pump preheaters are generally preferred to other types of preheater.

Mr. Diegoli *(Reporter)* proposed that the passage in his report dealing with combustion gas preheaters should be added to the text of the existing summary.

After an exchange of views between the President and Mr. Ducluzeau on the results obtained with these types of preheater, the proposal by Mr. Diegoli was accepted and *Summary No. 5* was adopted as follows :

« 5. In spite of increased maintenance costs, feed water preheating is widely used.

« Mixer type, pump preheaters are generally preferred to other types of preheater.

« The combustion gas preheater is capable of giving interesting results in suitable conditions. »

— The meeting closed at 12.0 noon.

Meeting held on the 21th May, 1954.

The meeting was opened at 9.0 a.m. by Mr. Goursat, *President of the Section*, who offered for discussion *Summary No. 6.*

6. Feed water treatment is done in fixed plants or in the boiler, the latter being in some cases complementary to the former. Direct treatment of water in the boiler seems to be developing. It offers in general in common with the combined treatments mentioned, considerable advantages as regards reduction in boiler maintenance and repair, increased locomotive availability and reduced consumption.

Mr. Ducluzeau was afraid that the existing text was capable of misinterpretation and that it should avoid any implication that internal treatment can be applied only after preliminary treatment.

Mr. Bulleid expressed a wish for a precise indication of the essential feature of internal treatment, which is a more modern technique than external treatment.

Mr. Ducluzeau pointed out that external treatment allowed a reduction in the cost of internal treatment.

After an exchange of views between the President, Mr. Cuttica *(Italian State Railways)*, Mr. Read and Mr. Bulleid, the meeting approved the following text for the first part of *Summary No. 6* :

« Feed water treatment is done either in fixed plants (external treatment), or in the boiler (internal treatment). Where fixed plants are already in existence, they may be used to reduce the cost of internal treatment. »

Mr. Ducluzeau wished the next part of the Summary to be amended to read as follows : « Direct treatment of water in the boiler is developing and is to be recommended. «

Mr. Flemming *(Deutsche Bundesbahn)* agreed with this proposal and stated that fixed plants are generally too costly.

— The proposal was approved.

— The final sentence of the Summary was also adopted subject to the deletion of the words « in common with the combined treatments mentioned. »

The complete text of *Summary No. 6* is therefore, as follows :

« 6. Feed water treatment is done either in fixed plants (external treatment), or in the boiler (internal treatment). Where fixed plants are already in existence, they

may be used to reduce the cost of internal treatment.

« Direct treatment of water in the boiler is developing and is to be recommended. It offers in general considerable advantages as regards reduction in boiler maintenance and repair, increased locomotive availability and reduced consumption ».

Summary No. 7 :

7. There is a tendency shown in favour of complete boiler lagging. No systematic trial has so far been effected to permit a conclusion for or against it.

Mr. VELICKOVIC *(Yugoslavian Railways)* reported that tests with insulation having a small air space have been in progress since 1953 and appear to be giving positive results.

Mr. SQUILBIN, *Special Reporter*, considered that these trials, being still in the experimental stage, did not call for any amendment to the Summary.

Mr. BULLEID stated that boiler insulation tests had been carried out 40 years ago, including the use of wood lagging.

Mr. FLEMMING mentioned that trials with asbestos lagging on Class 23 locomotives of the German Federal Railways had shown economies of 4 to 5 per cent, in fuel consumption.

In accordance with a proposal by Mr. BULLEID, it was decided to replace the expression « complete lagging » in the English text by « lagging » so as to make the English and French texts identical.

After exchange of views between the PRESIDENT, Mr. LONG, Mr. DUCLUZEAU and Mr. CUTTICA on the difficulty of evaluating the economies which can be effected, the meeting approved the following amended text for *Summary No. 7 :*

« 7. There is a tendency shown in favour of boiler lagging. It is not yet possible to give a decision for or against the system. »

Summary No. 8 :

8. No new tendency has been shown in recent years with regard to the various types of exhaust used on steam locomotives. Variable exhausts tend to disappear.

The text was adopted without amendment :

Summary No. 9 :

9. Cylindrical piston valves with Walschaerts gear prevail, by reason of their simplicity and ease of maintenance.

Poppet valves are used only in special cases (high speeds).

Following comments by Mr. BOND *(Honorary Committee and British Railways)* and Mr. DUCLUZEAU on the desirability of eliminating the expression « high speeds » or, on the other hand, of enumerating the various special cases, the following text was adopted :

« 9. Cylindrical piston valves with Walchaerts gear prevail, by reason of their simplicity and ease of maintenance.

« Poppet valves are used only in special cases. »

Summary No. 10 :

10. Despite the thermodynamic advantages which may result from the adoption of compounding, there appears to be a very clear tendency in favour of simple expansion because of the greater simplicity of the mechanism.

The President pointed out that the subject of this Summary had already been dealt with at an earlier Congress and the meeting approved the existing text of the Summary without amendment.

Summary No. 11 :

11. Air preheating, condensers and thermic syphons are little used and in all cases only in special circumstances.

The Special Reporter, Mr. Long and Mr. Cox stated that the information contained in the supplementary report by Mr. Long did not call for any amendment of this Summary, which was adopted without modification.

Summary No. 12 :

12. Annual mileages of locomotives have been considerably increased and now attain 80 000 to 90 000 km (49 700 to 56 000 miles); this is due to the development of multiple crew services, double or triple crews and even completely common usage.

Mr. Cox stated that 42 *Pacific* locomotives of British Railways achieve annual mileages of 73 800 miles, which was much in excess of the mileage stated by the *Special Reporter*.

Mr. Long mentioned mileages of 100 000 reached by some South African Railways' locomotives.

Mr. Ducluzeau stated that the increased mileages are not due solely to the organisation of the locomotive services with multiple crews or common usage, but also to improved maintenance methods and simplified mechanism.

A discussion regarding the English translation of the word « couramment » in the French text took place between Messrs. Bulleid, Cox and Chan *(French National Railways)*. It was decided that this should be expressed as « frequently ».

To take into account a statement by Mr. Ducluzeau and a suggestion by Mr. Cuttica, the President finally proposed the following text :

« 12. Annual mileages of locomotives have noticeably increased and frequently attain 80 000 to 90 000 km (49 700 to 56 000 miles). These results are due both to the improvement in the organisation of the service and the improvements in the methods of maintenance of the locomotives. »

— This text was approved by the meeting.

The President expressed his appreciation of the work of the *Special Reporter* and the *Reporters* and thanked the delegates for their contributions to the discussions.

— The meeting closed at 11.0 a.m.

— The complete text of the Summaries for *Question 4* is given hercafter :

SUMMARIES.

« 1. Steam traction is being progressively displaced by other types of traction, and little new steam locomotive construction is now envisaged.

« In view of the size of the stock of steam locomotives which will have to remain in service for many years to come, the main aim of the Administrations is to reduce to a minimum the cost of operation and to increase the

« availability of engines by improved « efficiency of performance and especially « by simplification.

« It would appear that in the search « for a lower operating cost for steam « traction, in the present state of steam « locomotive technique, particular atten- « tion should be paid, without any « cessation of the search for technical « improvement in the motive unit, to « improving the organisation of the loco- « motive's service (operation and main- « tenance).

« 2. Although certain Administrations « have obtained satisfactory results, from « the point of view of maintenance, « with higher pressures, the majority of « the Administrations consider that, to « avoid any risk of increased cost of « maintenance, boiler pressure should « not exceed 18 kg/cm² (256 lbs per « sq. inch) and the temperature of the « superheat should not exceed 400° C.

« 3. Various types of grate (fixed or « movable) are used on all locomotives. « None of these types appears to be « particularly outstanding.

« 4. Mechanical stocking is well devel- « oped for powerful locomotives, even for « locomotives having a grate area of « less than 5 m² (53 sq. ft.). It is advisa- « ble in spite of the resultant expense. It « also allows fuel to be used which is « not very suitable for hand firing.

« Oil firing has been extended but its « development depends mainly on the « comparative economic market in fuel « oil and coal.

« 5. In spite of increased maintenance « costs, feed water preheating is widely « used.

« Mixer type, pump preheaters are « generally preferred to other types of « preheater.

« The combustion gas preheater is « capable of giving interesting results in « suitable conditions.

« 6. Feed water treatment is done either « in fixed plants (external treatment), or « in the boiler (internal treatment). Where « fixed plants are already in existence, « they may be used to reduce the cost of « internal treatment.

« Direct treatment of water in the boiler « is developing and is to be recommended. « It offers in general considerable advant- « ages as regards reduction in boiler « maintenance and repair, increased loco- « motive availability and reduced con- « sumption.

« 7. There is a tendency shown in « favour of boiler lagging. It is not yet « possible to give a decision for or « against the system.

« 8. No new tendency has been shown « in recent years with regard to the « various types of exhaust used on steam « locomotives. Variable exhausts tend « to disappear.

« 9. Cylindrical piston valves with « Walschaerts gear prevail, by reason of « their simplicity and ease of maintenance.

« Poppet valves are used only in « special cases.

« 10. Despite the thermodynamic advant- « ages which may result from the adop- « tion of compounding, there appears to « be a very clear tendency in favour of « simple expansion because of the greater « simplicity of the mechanism.

« 11. Air preheating, condensers and « thermic syphons are little used and in « all cases only in special circumstances.

« 12. Annual mileages of locomotives « have noticeably increased and fre- « quently attain 80 000 to 90 000 km « (49 700 to 56 000 miles). These results « are due both to the improvement in the « organisation of the service and the « improvements in the methods of main- « tenance of the locomotives. »

— These Summaries were ratified by the Plenary Meeting on the 25th May 1954.

SECTION III. — Working.

President : Prof. Dr.-Ing. W. SCHMITZ.

Vice-Presidents : A. CLEMANG, C. MELISSINOS, FL. LEHTINEN.

Principal Secretary : A. MARCHAL.

QUESTION 5.

Radiophonic communications in railway working.

Preliminary documents.

Report (America (North and South), Australia (Commonwealth of), Burma, Ceylon, Denmark, Egypt, Finland, India, Indonesia, Irak, Iran, Republic of Ireland, New Zealand, Norway, South Africa, Sweden and the United Kingdom of Great Britain and Northern Ireland and the territories for whose international relations the United Kingdom is responsible), by S. G. HEARN and J. H. FRASER. (See *Bulletins* for September 1953, p. 615, and October 1953, p. 709, or separate issue No. 5.)

Report (Austria, Belgium and Colony, Bulgaria, Czechoslovakia, France and French Union, Germany, Greece, Hungary, Italy, Luxemburg, Netherlands, Poland, Portugal and Colonies, Rumania, Spain, Switzerland, Syria, Turkey and Yugoslavia), by J. FRISCHAUF. (See *Bulletin* for April 1954, p. 405, or separate issue No. 23.)

Special Report by S. G. HEARN. (See *Bulletin* for May 1954, p. 534.)

Report of Section III.

(See the *Congress Daily Journal :* No. 4, pp. 6/9; No. 5, pp. 4/6; and No. 6, p. 4.)

The PRESIDENT called Mr. S. G. HEARN, *Special Reporter*, who gave a résumé of his report and passed to the reading of the Summaries.

A. *Introduction.*

Summary No. 1 :

1. The potentialities of radio for communications with and between mobile units have been the main reason for development of this form of communication in some countries during the last 10 years.

— Adopted without discussion.

Summary No. 2 :

2. In addition, radio may under some special circumstances be a cheaper and safer alternative means of providing communication between fixed stations.

Following a discussion, in which Lt.-Col. WILSON *(Ministry of Transport and Civil Aviation, Great Britain)* and Mr. WALTER *(French National Railways)* took part, it was decided to make the following modifications :

In the English text « safer » to become « more reliable ».

In the French text « plus sur » to become « d'un fonctionnement plus régulier ».

— The following text was therefore adopted :

« 2. In addition, radio may under some special circumstances be a cheaper and more reliable alternative means of providing communication between fixed stations. »

Summary No. 3 :

3. Technical advances in this relatively modern method of communication should receive the attention of Railway Administrations.

— Adopted without remark.

On the proposition of Mr. MARCHAND *(French National Railways)*, it was decided to discuss *Summaries Nos. 4 to 7* together.

Summaries Nos. 4 to 7 :

B. *Communication with and on Trains en Route.*

4. Radio-telephony is used more extensively in the U.S.A. than elsewhere. It is used there for communication between the front and rear of long freight trains where exchange of hand signals would be difficult, or with banking or assisting engines to co-ordinate their movements.

5. Radio also enables one train to report dangerous conditions to another.

6. With the train dispatch system of working, the train crews can report to the dispatcher and he can co-ordinate their movements more easily.

7. If train crews have portable radio sets, defects on a long freight train can be reported to the driver or guard by a member of the crew. Also when the guard goes back to protect his train he can speak to his own or an approaching train.

After discussion, in which the PRESIDENT and Messrs. HEARN, MARCHAND, TRIBELHORN *(Swiss Federal Railways)*, DARGEOU *(French National Railways)*, CREM *(Belgian National Railways)*, Lt.-Col. WILSON, Messrs. CIRILLO *(Italian State Railways)* and BARBAUT *(Chemins de fer Tunisiens)* took part, it was decided to appoint a sub-committee, composed of the SPECIAL REPORTER, Lt.-Col. WILSON and Mr. MARCHAND, to incorporate the proposed revisions to the text.

Summaries Nos. 8 to 11 :

C. *Marshalling yards and terminal areas.*

8. Radio-telephony is used in marshalling yards :

a) Between some central supervisory point such as a Yardmaster's office and locomotives in the yard.

b) Between the person in charge of propelling movements over a hump and the driver of a locomotive engaged on humping operations.

c) Between inspectors, foremen or shunters and drivers of locomotives engaged on shunting operations in other parts of the yard.

d) To and from wagon examiners where speed is desirable in reporting defective wagons or bad loads.

e) To and from checkers or numbertakers where detailed recording of the composition of trains is necessary.

9. Under conditions of poor visibility, even greater advantages are secured in connection with the above uses (par. 8 *a* to *e*).

10. Reliable radio communication can lead to savings in locomotive and man hours, reductions in the number and gravity of mishaps, and a speed-up in the clearance of sorting sidings. The quicker passage of wagons through a yard increases its capacity and may, in some circumstances, obviate the necessity for additional sidings or extension of signalling.

11. In terminal areas a considerable amount of waste movement and time can be avoided and greater efficiency attained by employing radio between a central supervisory point and locomotives serving distant depots, dock areas, factories, and other siding-connected undertakings.

In connection with *Summaries Nos. 8 to 11*, the following delegates took part in a discussion :

the PRESIDENT, Messrs. HEARN, CIRILLO, MARCHAND, WALTER, HANCE *(Belgian National Railways)*, INGLIS *(British Railways)*, MOULART *(Belgian National Railways)* and FRASER *(Reporter)*.

It was decided to remit consideration of these *Summaries 8 to 11* to the Sub-committee mentioned above.

The Section then examined the following Chapter :

D. *Engineering Operations and Ancillary Services.*

Summary No. 12 :

12. When radio-telephony is employed to link railway construction gangs and maintenance gangs on track, electrical overhead equipment and signalling, with engineering supervisors and traffic department posts, closer co-ordination and utilisation of men, materials and equipment is possible.

M. CIRILLO, having raised the question as to whether radio-telephony was of assistance for the protection of staff on the track, Mr. FRASER expressed certain doubts on this point.

— Adopted without alteration.

Summary No. 13 :

13. Advantages are obtained by the use of radio-telephony when clearing lines in the case of accident, and for controlling the movements of snow ploughs, etc.

— This Summary was adopted without discussion.

Summary No. 14 :

14. Although experiments have been made, little evidence is forthcoming of the application of radio-telephony to the control of railway-owned road collection and delivery vehicles. This appears to be a field in which radio could be employed to reduce mileage, summon assistance in the event of breakdowns or accidents, direct vehicles to pick up urgent consignments, and generally to give a better commercial service.

Mr. TAYLOR *(British Government)* was rather concerned at the paragraph commencing. « This appears to be a field in which radio could be employed to reduce mileage, etc... »

So far he was concerned, the following problems arose :

1) To install numerous control posts and equipment in many vehicles for the use of a constantly changing staff, inexperienced in the operation of radio equipment would be costly;

2) In large cities, it was frequently difficult to assure perfect reception at all points;

3) Instructions might be overheard by dishonest people.

Mr. GUTHRIE *(Coras Iompair Eireann, Ireland)* referred to the use of radio for road service vehicles and for supervising special events.

Mr. CIRILLO would agree for its use generally in such cases but not for infrequent occasions only.

Mr. HEARN, *Special Reporter*, did not deny the existence of technical difficulties, but experiments made by his Administration had been sucessful. The difficulties could be solved.

Following these remarks, the text of *Summary No. 14* was adopted without alteration.

Summary No. 15 :

15. The use of radio by railway police has assisted in the prevention and detection of thefts from railway vehicles and premises.

— *Summary No. 15* was adopted without discussion.

Summary No. 16 :

16. The provision of a radio-telephone service for passengers to and from the public telephone system is largely influenced by the distances traversed by the trains and commercial considerations.

M. Dargeou proposed a small modification which was agreed by the Special Reporter and the delegates.

— The text was altered as follows :

« 16. The provision of a radio-telephone service to *connect passengers in the trains* to the public telephone system is largely infuenced by the distances traversed by the trains and commercial considerations. »

E. *Communication between fixed points.*

Summary No. 17 :

17. The use of radio for communication between fixed points is worthy of consideration where :

a) Great distances have to be covered involving the erection of long stretches of aerial wires or laying fo cables.

b) Telephone lines are costly and difficult to maintain owing to topographical or climatic conditions.

c) Communications are subject to sabotage.

Mr. Addington *(East African Railways and Harbours)* stated that the experience of his Administration confirmed Mr. Hearn's conclusion. He pointed out that in Africa the maintenance of radio equipment was very costly.

A possible solution was in the use of carrier currents or physical circuits.

Mr. Davis *(Nigerian Railway)* stated that, under tropical conditions, aerial lines are frequently destroyed and that radio equipment was therefore very useful.

M. Hance indicated that Belgian experience showed the value of radio communication over medium distances. Consequently he proposed the following modification to paragraph 17 *a*) :

« *a*) Distances relatively great have to be covered involving the erection of long stretches of aerial wires or laying of cables. »

This alteration was adopted.

M. Dargeou asked that paragraph 17 *c*) should be enlarged as follows :

c) Communications are subject to sabotage, to destruction or to damage of all kinds. »

Summary No. 17 was adopted with these alterations to points *a*) and *c*).

Summary No. 18 :

18. Beamed radio using microwave technique may be particularly advantageous for these conditions. While these systems are expensive, they might be justified where there is a considerable density of message traffic between any two particular stations.

— This Summary was adopted without alteration.

The sub-committee charged with the modification of Chapters « B » and « C » (Mr. HEARN, Lt.-Col. WILSON and Mr. MARCHAND) proposed for discussion at the next meeting the following revised text :

B. *Communication with and on Trains En Route.*

« 4. Radio-telephonic communication with and on moving trains is used more extensively in the U.S.A. than elsewhere : the circumstances in which it is used depend essentially on the methods of operation. »

« 5. Radio-telephony between trains and fixed points is particularly suitable for lines operated by « dispatching » and « train orders » : it assures a readily available liaison between the train staff and the dispatcher who may thus co-ordinate movements more easily to increase the efficiency of working and prevent delays.

« In its present state of development, however, radiotelephony between trains and fixed points is unsuitable for controlling train movements from the safety point of view (except possibly where traffic is light). »

« 6. Radio-telephony between the front and rear of trains can only be justified when the regulations necessitate the presence of a guard at the rear and when the length of trains make visual communication difficult between guard and driver. »

« 7. When, for the reasons given above, trains and train staff are provided with radio equipment, it may be used :

« — To assure communication between the train engine and the banking or assisting engine to co-ordinate their movements.

« — To warn a train of possible danger.

« — To warn the driver or guard of defects found by a member of the train staff. »

C. *Marshalling Yards and Terminal Areas.*

« 8. Radio-telephony is used in marshalling yards :

« *a*) Between some central supervisory point such as a Yardmaster's office and locomotives in the yard.

« *b*) Between the person in charge of propelling movements over a hump and the driver of a locomotive engaged on humping operations.

« *c*) Between inspectors, foremen or shunters and drivers of locomotives engaged on shunting operations in other parts of the yard.

« *d*) To and from wagon examiners where speed is desirable in reporting defective wagons or bad loads.

« *e*) To and from checkers or numbertakers where detailed recording of the composition of trains is necessary. »

« 9. Reliable radio communication can lead to savings in locomotive and man hours, reductions in the number and gravity of mishaps, and a speed-up in the clearance of sorting sidings. The quicker passage of wagons through a yard increases its capacity and might, in some circumstances, obviate the necessity for additional sidings or extension of signalling.

« 10. In terminal areas waste movement

and time can be avoided and greater efficiency attained by employing radio between a central supervisory point and locomotives serving distant depots, dock areas, factories, and other siding-connected undertakings. »

« 11. Radio-telephony may also facilitate the working at large passenger stations by assuring close and readily available liaison between the station master and the signal boxes, on the one hand, and the shunting engines on the other.

« The use of transportable radio-telephony apparatus giving communication between the front and rear of empty train sets can also facilitate the working of these sets by propelling movements. »

« 12. Under conditions of poor visibility, even greater advantages are secured in connection with the above uses. (Par. 8 to 11.) »

Meeting held on the 25th May 1954.

The President asked Mr. Hearn to continue the reading of the Summaries of his Special Report relating to Chapter F.: *Licensing.*

Mr. Hearn read in succession *Summaries Nos. 19, 20, 21, 22 and 23.*

Summary No. 19 :

19. In all countries, licenses to operate radio stations have to be obtained from the appropriate authority in control of the telecommunication services of the country. Consequently the frequencies allotted and signal strength permitted to the railways govern the character of the service in which they can be employed and the method of their utilisation.

20. In some countries the licensing authorities have discouraged the use of radio for communication between fixed points, owing to the requirements of national and public services such as aviation, broadcasting, etc., for which no other form of communication but radio is practicable.

21. It is possible, however, that in such cases licensing authorities will look with greater favour on the introduction of microwave systems for fixed point-to-point communication in view of the greater number of channels available, and the advantages gained by utilising beamed transmission to reduce interference with other radio services.

22. In general, the frequencies allotted to Railway Administrations are in the very high frequency band (VHF) or above. This, whilst limiting the range, minimises interference and enables the same frequencies to be employed simultaneously in different localities.

— These Summaries were adopted without discussion.

G. *Apparatus.*

23. Radio equipment for railway purposes must be robust and compact and in the case of mobile stations, waterproof.

— Adopted without discussion.

Summary No. 24 :

24. Recently the size and weight of radio sets of all types have been reduced, and developments in this direction should be encouraged. If equipment of a more readily transportable character were available, it would facilitate the introduction of radio in places and for purposes where it is not yet a practical proposition.

Mr. Cirillo requested that, if possible, a limiting weight should be stated for portable radio sets used by mobile staff to communicate with a fixed point. At present there were sets weighing 3 kg, but this appeared to him to be too heavy.

The PRESIDENT asked Mr. CIRILLO to indicate a value which would be acceptable to him.

Mr. CIRILLO stated that 1.5 kg would suit his purpose, but he would not refuse anything lighter in weight.

Mr. WALTER drew attention to the fact that the weight of portable equipment depended to a large extent on the source of power (dry cells or accumulators).

It was for the Operating Department to say if they would accept apparatus light in weight but costly to maintain and having a short operating period or, if they required apparatus economic in service with a longer operating period but heavier in weight.

On this question it seemed to him that :

a) For wagon numbertakers, etc., in marshalling yards, light portable sets having a short operating period were suitable.

b) For use in connection with construction and maintenance works on the tracks, heavier transportable sets could be accepted, weighing up to 12 kg since these sets did not have to be moved frequently.

M. DARGEOU stated that it was desirable to provide :

— light individually portable sets, weighing less than 2 kg for mobile staff in stations, numbertakers, etc.

— transportable sets, weighing up to 12 kg for use on shunting engines or construction works.

After discussion, in which the PRESIDENT and Mr. DARGEOU took part, Mr. WALTER proposed a modification to *Summary No. 24.*

Mr. NGUYEN QUANG DAT *(Régie des Chemins de fer non concédés du Viet-Nam)* referred to the necessity of obtaining radio sets shielded against interference from electric traction and the generators and motors of diesel locomotives.

Mr. A. BARBAUT agreed with Mr. NGUYEN QUANG DAT. In addition, he would be pleased to know where in the U.S.A. *permanent use* was made of radio communication between moving trains, and to have details of how this was effected.

Mr. HEARN stated that he would furnish all the available information in his possession at the end of the meeting.

Mr. MARCHAL, *Principal Secretary*, read the revised text of *Summary No. 24*, modified in accordance with the remarks of Messrs. WALTER and DARGEOU and worded as follows :

« 24. Recently the size and weight of radio sets of all types have been reduced, and developments in this direction should be encouraged. In this connection two types of sets may be employed according to the conditions under which they are used :

« — light individually portable sets, not exceeding approximately 2 kg in weight;

« — transportable sets not exceeding 12 kg in weight which may be moved by one man. »

Summary No. 25 :

25. Aerials on railway vehicles must be of special types to keep within the permitted clearances and be protected against high ten-

sion contact wires. The limitations imposed by the loading gauge have not had any serious effect on radio communications.

Mr. Walter suggested an alteration to the first paragraph :

« Aerials on railway vehicles should be of a type which keeps within the permitted structural gauge clearances and with which there is no risk of contact with high tension contact wires. »

— Adopted with this alteration.

Summary No. 26 :

26. Continuity of radio signals in long tunnels, deep cuttings and valleys bounded by high mountains is only possible today by using special equipment.

— This Summary was adopted without discussion.

The President then proposed to the Delegates that the meeting should examine point by point the new text for Chapters « B » and « C » drawn up by the Sub-Committee. (See *Congress Daily Journal* No. 4.)

He then read *Summaries Nos. 4 to 7* of *Chapter* B : *Communication with and on Trains En Route.*

— The new text was adopted.

The revised text of *Summaries Nos. 8 to 12* relative to *Chapter* C : *Marshalling Yards and Terminal Areas* was then read.

— The new *Summary No. 8* was adopted.

Messrs. Hearn, Walter, Cirillo, Fraser, Tolotti, Lt.-Col. Wilson, Messrs. Marchand, Dargeou and Hance took part in a discussion, which lead to the approval of the following amended text for *Summaries Nos. 9 and 11 :*

Summary No. 9 :

« 9. Reliable radio communication can lead to savings in locomotive and man hours, reductions in the number and gravity of mishaps, and a speed-up in the clearance of sorting sidings. *The quicker passage of wagons through a yard increases its capacity and might, in some circumstances, obviate the necessity for laying additional tracks and for providing humping signals.* »

New *Summary No. 10* was approved without remark for the French text.

For the English text, Lt.-Col. Wilson asked that the title for Chapter « C » should be amended to read :

« C. *Marshalling Yards and Large Centres* » and that the first sentence of *Summary No. 10* should commence : « In large centres waste movement... ».

Summary No. 11 :

« 11. Radio-telephony may also facilitate the working at large passenger stations by assuring close and readily available liaison between the station master and the signal boxes, on the one hand, and the shunting engines on the other.

« *The use of transportable radio-telephony apparatus, giving communication between the front and rear of empty train sets, can also facilitate the carrying out of propelling movements.* »

Mr. Hance wished the Operating Departments to say if they were content to have *one frequency only* for the whole

of a marshalling yard or if they wished to have a special frequency for the equipment for each locomotive.

He suggested an additional clause to Chapter « C ».

Mr. CIRILLO did not wish to place any limitation on the application of radio-telephony by making the summary texts too rigid. He would prefer to retain the Special Reporter's text.

Mr. JAROS *(Railway Ministry, Poland)* wished to co-ordinate the use of the three transmission methods adopted in marshalling yards, *viz.*, telephone, loud speaker and radio, in order to obtain the most economical arrangement.

Mr. DARGEOU did not wish to introduce new summaries because it might be necessary, in certain cases, to use all possible alternatives (multiple frequency, selective calling, etc.).

Mr. VOORDECKER *(O.T.R.A.C.O., Belgium)* agreed with the remarks of Messrs. CIRILLO and DARGEOU.

Mr. HANCE stated that he wished to draw attention to the existence of selective systems, but Mr. FRASER replied that these systems were referred to in the Report.

After discussion, it was decided to revise *Summary No. 12* as follows :

« 12. Under conditions of poor visibility, even greater advantages are secured. »

Important Note. — The final text of Sections « B » and « C » now includes Summary No. 12, whilst the text prepared by the Special Reporter has only 11 Summaries. It will be necessary, therefore, to alter the numbers of the paragraphs in Sections « D », « E », « F » and « G », which should read from Nos. 13 to 27.

The work of the Section then being complete, the PRESIDENT thanked the Delegates, and expecially the Reporters and the Special Reporter, the collaborators and secretaries of the Bureau.

Messrs. FRASER and DARGEOU, on behalf of the Delegates, thanked the PRESIDENT.

— The meeting closed at 11.0 a.m.

— The complete text of the Summaries for *Question 5* is as follows :

SUMMARIES.

A. — Introduction.

« 1. The potentialities of radio for « communications with and between mo- « bile units have been the main reason « for development of this form of com- « munication in some countries during « the last 10 years.

« 2. In addition, radio may under some « special circumstances be a cheaper and « more reliable alternative means of « providing communication between fix- « ed stations.

« 3. Technical advances in this relatively « modern method of communication « should receive the attention of Railway « Administrations.

B. — Communication with and on trains en route.

« 4. Radio-telephonic communication « with and on moving trains is used more

« extensively in the U.S.A. than elsewhere : the circumstances in which it is used depend essentially on the methods of operation.

« 5. Radio-telephony between trains and fixed points is particularly suitable for lines operated by « dispatching » and train orders » : it assures a readily available liaison between the train staff and the dispatcher who may thus co-ordinate movements more easily to increase the efficiency of working and prevent delays.

« In its present state of development, however, radio-telephony between trains and fixed points is unsuitable for controlling train movements from the safety point of view (except possibly where traffic is light).

« 6. Radio-telephony between the front and rear of trains can only be justified when the regulations necessitate the presence of a guard at the rear and when the length of trains makes visual communication difficult between guard and driver.

« 7. When, for the reasons given above, trains and train staff are provided with radio equipment, it may be used :

« — to assure communication between the trains engine and the banking or assisting engine to co-ordinate their movements;

« — to warn a train of possible danger;

« — to warn the driver or guard of defects found by a member of the train staff.

C. — Marshalling yards and large centres.

« 8. Radio-telephony is used in marshalling yards :

« *(a)* Between some central supervisory point such as a yardmaster's office and locomotives in the yard.

« *(b)* Between the person in charge of propelling movements over a hump and the driver of a locomotive engaged on humping operations.

« *(c)* Between inspectors, foremen or shunters and drivers of locomotives engaged on shunting operations in other parts of the yard.

« *(d)* To and from wagon examiners where speed is desirable in reporting defective wagons or bad loads.

« *(e)* To and from checkers or numbertakers, where detailed recording of the composition of trains is necessary.

« 9. Reliable radio communication can lead to savings in locomotive and man hours, reductions in the number and gravity of mishaps, and a speed-up in the clearance of sorting sidings. The quicker passage of wagons through a yard increases its capacity and might, in some circumstances, obviate the necessity for laying additional tracks and for providing humping signals.

« 10. In large centres waste movement and time can be avoided and greater efficiency attained by employing radio between a central supervisory point and locomotives serving distant depots, dock areas, factories, and other siding-connected undertakings.

« 11. Radio-telephony may also facilitate the working at large passenger stations by assuring close and readily available liaison between the station master and the signal boxes, on the one hand, and the shunting engines on the other.

« The use of transportable radio-tele- « phony apparatus, giving communica- « tion between the front and rear of « empty train sets, can also facilitate the « carrying out of propelling movements.

« 12. Under conditions of poor visi- « bility, even greater advantages are « secured.

D. — Engineering operations and ancillary services.

« 13. When radio-telephony is em- « ployed to link railway construction « gangs and maintenance gangs on track, « electrical overhead equipment and si- « gnalling, with engineering supervisors « and traffic department posts, closer « co-ordination and utilisation of men, « materials and equipment is possible.

« 14. Advantages are obtained by the « use of radio-telephony when clearing « lines in the case of accident, and for « controlling the movements of snow « ploughs, etc.

« 15. Although experiments have been « made, little evidence is forthcoming of « the application of radio-telephony to « the control of railway-owned road « collection and delivery vehicles. This « appears to be a field in which radio « could be employed to reduce mileage, « summon assistance in the event of « breakdowns or accidents, direct vehicles « to pick up urgent consignments, and « generally to give a better commercial « service.

« 16. The use of radio by railway police « has assisted in the prevention and « detection of thefts from railway vehicles « and premises.

« 17. The provision of a radio-telephone « service to connect passengers in the « trains to the public telephone system is « largely infuenced by the distances tra- « versed by the trains and commercial « considerations.

E. — Communication between fixed points.

« 18. The use of radio for communica- « tion between fixed points is worthy of « consideration where :

« *(a)* Distances relatively great have to « be covered involving the erection of « long stretches of aerial wires or laying « of cables.

« *(b)* Telephone lines are costly and « difficult to maintain owing to topo- « graphical or climatic conditions.

« *(c)* Communications are subject to « sabotage, to destruction or to damage « of all kinds.

« 19. Beamed radio using microwave « technique may be particularly advant- « ageous for these conditions. While « these systems are expensive, they might « be justified where there is a consider- « able density of message traffic between « any two particular stations.

F. — Licensing.

« 20. In all countries, licenses to « operate radio stations have to be « obtained from the appropriate autho- « rity in control of the telecommunica- « tion services of the country. Conse- « quently the frequencies allotted and « signal strength permitted to the railways « govern the character of the service in « which they can be employed and the « method of their utilisation.

« 21. In some countries the licensing « authorities have discouraged the use « of radio for communication between « fixed points, owing to the requirements « of national and public services such as « aviation, broadcasting, etc., for which « no other form of communication but « radio is practicable.

« 22. It is possible, however, that in « such cases licensing authorities will « look with greater favour on the intro- « duction of microwave systems for fixed « point-to-point communication in view « of the greater number of channels avail- « able, and the advantages gained by « utilising beamed transmission to reduce « interference with other radio services.

« 23. In general, the frequencies allotted « to Railway Administrations are in the « very high frequency band (VHF) or « above. This, whilst limiting the range, « minimises interference and enables the « same frequencies to be employed simul- « taneously in different localities.

G. — Apparatus.

« 24. Radio equipment for railway pur- « poses must be robust and compact and « in the case of mobile stations, water- « proof.

« 25. Recently the size and weight of « radio sets of all types have been reduc- « ed, and developments in this direction « should be encouraged. In this connec- « tion two types of sets may be employed « according to the conditions under which « they are used :

« light individually portable sets, not « exceeding approximately 2 kg in weight;

« transportable sets not exceeding 12 kg « in weight which may be moved by one « man.

« 26. Aerials on railway vehicles should « be of a type which keeps within the « permitted structural gauge clearances « and with which there is no risk of « contact with high tension contact wires.

« The limitations imposed by the load- « ing gauge have not had any serious « effect on radio communications.

« 27. Continuity of radio signals in « long tunnels, deep cuttings and valleys « bounded by high mountains is only « possible today by using special equip- « ment. »

— These Summaries were ratified by the Plenary Meeting held on May 26, 1954.

QUESTION 6.

A. — Remote operation of signal boxes: technical realisations, working orders.

B. — Electric working and control devices for hinged and « flexible » points and switches.

Control of accidental trailing of the switch blade.

Preliminary documents.

a) Report (America (North and South), Australia (Commonwealth of), Burma, Ceylon, Denmark, Egypt, Finland, India, Indonesia, Irak, Iran, Republic of Ireland, New Zealand, Norway, Pakistan, South Africa, Sweden and the United Kingdom of Great Britain and Northern Ireland and the territories for whose international relations the United Kingdom is responsible), by R. SØRVIK. (See *Bulletin* for August 1953, p. 495, or separate issue No. 2.)

b) Report (Belgium and Colony, Spain, France and French Union, Greece, Italy, Luxemburg, Netherlands, Portugal and Colonies, Switzerland, Syria and Turkey), by

J. NOGUÉS. (See *Bulletin* for Octobre 1953, p. 801, or separate issue No. 8.)

c) Report (Austria, Bulgaria, Czechoslovakia, Germany, Hungary, Poland, Rumania and Yugoslavia), by Prof. A. DOBMAIER. (See *Bulletin* for November 1953, p. 923, or separate issue No. 12.)

Special Report by J. NOGUÉS. (See *Bulletin* for May 1954, p. 534.)

Report of Section III.

(See the *Congress Daily Journal :* No. 2, pp. 6/8; No. 3, pp. 5/7; No. 4, p. 6; No. 5, pp. 4 and 9.)

Meeting held on the 25th May, 1954.

The meeting opened at 9.0 a.m. under the presidency of Prof. Dr.-Ing. W. SCHMITZ.

The PRESIDENT called upon Mr. NOGUÉS, *Special Reporter*, who made a résumé of his special report and then read successively the summaries relating to *(Part A)*

Remote operation of signal boxes : technical realizations, working orders.

Summary No. 1 :

1. Remote control of signalling installations is becoming more and more extended and is developing along two distinct lines : (*a*) remote control of stations, as a rule small ones, *situated along a line* (C.T.C.); (*b*) remote control of groups of points and signals in large stations, situated in areas some distance away, or of the equipment at junctions and crossings between lines, such control being effected from a neighbouring station.

— Adopted without discussion.

Summary No. 2 :

2. On *single line*, C.T.C. is being applied in order to increase the capacity and flexibility of the working on heavily trafficked routes in order to avoid having to double the line, or to effect a reduction in the staff ordinarily on duty at the stations. The value of the results obtained under both these aspects depends on the methods of working adopted in the various countries and the conditions obtaining previously on each line in question.

Mr. DARGEOU *(French National Railways)* specified that the advantages of C.T.C. are more important for lines operated with « dispatching » or « train orders » than for lines where the points and signals are operated by station staff.

Mr. TOLOTTI *(Italian State Railways)* agreed with Mr. DARGEOU. He considered also that the advantages of C.T.C. depended on the traffic intensity on the line equipped (as for the case of double lines).

Mr. NOGUÉS, *Special Reporter*, had explained these different ideas in his Report, but he had been requested to be concise in the Summaries.

Mr. DARGEOU handed to Mr. NOGUÉS a proposed addition to the text.

Mr. MARCHAND *(French National Railways)* considered that the addition made, emphasised the fundamental differences between operating conditions in the U.S.A. and in Europe.

Mr. CIRILLO *(Italian State Railways)* stated that Italy had studied and commenced to instal C.T.C. equipment on a single line of 17 km, heavily trafficked and situated between two sections of double line.

The ends pursued are :

1) increase in the capacity of the line;

2) certain economies in station staff.

This example showed that in Europe also C.T.C. was useful in certain cases of single lines.

Mr. Dargeou amended slightly his proposed addition which satisfied Mr. Cirillo and received the approval of the meeting.

Summary No 2 was completed by the following addition :

« If these results are important on lines operated by the dispatching system with train order, they are generally more reduced on other lines notably when they are equipped with a dispatching system, and when the operation of points and signals is effected by station staff from the station buildings. »

— The text adopted is the following :

« 2. On *single* line, C.T.C. is being applied in order to increase the capacity and flexibility of the working on heavily trafficked routes in order to avoid having to double the line, or to effect a reduction in the staff ordinarily on duty at the stations. The results obtained under both these aspects depend on the methods of working adopted in the various countries and the conditions obtaining previously on each line in question.

« If these results are important on lines operated by the dispatching system with train order, they are generally more reduced on other lines notably when they are equipped with a dispatching system, and when the operation of points and signals is effected by station staff from the station buildings. »

Summary No. 3 :

3. C.T.C. is to be recommended on *double lines* when it is a question of adopting reversible working on each track in order to obtain greater traffic capacity, or to avoid having to lay down additional lines. The best results are obtained when the periods of maximum traffic load on the two tracks do not coincide and the number of cases of trains having to be put into a siding for another to pass is large on account of a number of trains following each other at differing speeds.

— This Summary was approved without discussion.

Summary No. 4 :

4. Remote control applied to the electric operation of points and signals in the outer areas of large stations or at nearby junctions, etc., allows of extending in an economic manner the radius of action of signal boxes to cover very considerable areas.

The saving in first cost depends on the balance obtained between the reduction in the cost of cabling and that of providing the remote control equipment. This saving becomes more noticeable as the number of items of apparatus remotely controlled at each location increases and as their distance from the central controlling apparatus becomes greater.

Concentrating the remote control of the operation of points and signals in large areas allows of suppressing the large number of staff otherwise required. This gives rise to savings in staff and greater capacity and flexibility of working.

Mr. Walter *(French National Railways)* stated that remote control permitted the provision of complex installations and this technique was not limited as compared with other methods.

Mr. Fraser *(British Railways)* agreed fully regarding the possibilities of employing C.T.C. for remote systems of

control, but pointed out that this depended to some extent on the speed of the transmission of the codes. C.T.C. was not always fully suitable for heavy traffic conditions.

Mr. CIRILLO asked what were the real possibilities of economising in staff in installations where junctions were controlled from neighbouring stations in cases of failures.

Mr. TRIBELHORN *(Swiss Federal Railways)* said the high rates of wages had led to investigations into a reduction in the number of signal boxes. He indicated that the question of failures is of little importance as staff is sent, when necessary, from other stations.

Mr. MARCHAND in reply to Mr. CIRILLO stated that no special arrangements, such as emergency electric operation, are provided. Manual operation on the site is alone employed. Such incidents are extremely rare.

Mr. MAXWELL *(London Transport Executive)* said that on London Transport, with a service of trains running at minute and a half intervals, it had been difficult to justify the first cost of the original remote control installations by operating staff economies. This was because retention of qualified staff at the site of the remotely controlled station or points, to take over control either manually or electrically, was virtually as expensive in wages as manning the original signal box itself.

Unless 100% reliability of the apparatus could have been guaranteed from the outset, this seemed the only step to take; but now that experience was beginning to show that reliance could be placed on the equipment, it should not be necessary to retain qualified staff for emergency operation of the remotely controlled points or station.

Mr. DARGEOU *(French National Railways)* stated that he had complete faith in C.T.C.

Mr. FRASER remarked that signalling maintenance staff stationed on the site could remedy failures rapidly and in consequence the withdrawal of emergency operating staff could be envisaged.

Mr. NOGUÉS, *Special Reporter*, then read the new text presented by Mr. WALTER for the first paragraph of *Summary No. 4.*

« Remote control applied to the electric operation of points and signals *individually or by route* locking in the outer areas of large stations or at nearby junctions, etc. allows of extending in an economic manner the radius of action of signal boxes to cover very considerable areas. »

— *Summary No. 4* was adopted with this alteration.

Summary No. 5 :

5. Lines or areas remotely controlled are always provided with track circuiting, or equivalent apparatus, such as axle counters, to check up the occupation of the tracks and register the movements of trains.

Generally such installations are completed by having automatic signalling applied to them, taking advantage of the presence of track circuiting.

Only those signals which protect points are habitually remotely controlled as regards their absolute stop indications.

The PRESIDENT asked the real sense of the word « generally ».

Mr. TOLOTTI *(Italian State Railways)* remarked that the provision of track circuits on lines controlled by C.T.C. led in Italy to the systematic use of automatic block. However, the word « generally » is suitable, if it is understood to apply also to the remote control of groups of points at large stations.

The PRESIDENT agreed, and the text was adopted without change.

Summary No. 6 :

6. The systems most generally used for remote control transmission are those employing D.C. impulses, which can differ as regards the duration of the impulses and cuttings or concerning the polarity of the impulses.

The so-called « time code » system (code of short and long impulses) is the one most used in C.T.C.

The polarized impulse systems and the induced impulse systems seem to be preferred where rapidity of transmission becomes an important factor.

— *Summary No. 6* was adopted without discussion.

Summary No. 7 :

7. Safety interlocking arrangements in remotely controlled installations are habitually effected at the subsidiary lineside locations and are consequently independent of the remote control itself. In this way, any error or defect in the transmission of a control or a return indication has no effect on the safety of the working.

Mr. TOLOTTI said that certain Administrations employ remote control, but with special precautions, to give security indications :

— detection of the closing of a signal;

— train out of Section.

It can be affirmed that security interlocking is independent of the remote control.

The PRESIDENT stated that in Germany remote control is not used for security reasons which are *always* effected at the local lineside location.

Mr. MARCHAND thought that the word « habitually » included in the text covered the objections raised.

— Finally, the original text of *Summary No. 7* was adopted.

Summary No. 8 :

8. The numerous relays used in remote control installations are of the telephone type, but an endeavour is made to improve their quality and characteristics by a finer degree of manufacture, using improved up-to-date processes and sometimes by making them larger and more robust than actual telephone relays.

Mr. TOLOTTI thought that it was perhaps an exaggeration to state that relays employed on C.T.C. are of the telephone type.

Installations in hand in Italy were using apparatus very different in characteristics from telephone apparatus.

The PRESIDENT said that in Germany remote control relays are, in effect, of the telephone type.

Mr. WALTER proposed to modify the text as follows :

« The numerous relays used in remote control installations *are more similar*

in type to telephone-type relays than to signalling relays, but an endeavour is made... »

— The modified text was adopted.

Summary No. 9 :

9. These installations are widely used in the United States. Nevertheless, experience gained by most of the managements concerned does not appear as yet to be sufficient by reason of the small number of installations in use and the short lengths of time they have been in service, to enable any final general conclusions to be reached as to the preference to be accorded to this or that way of carrying out a remote control system, such as the number and function of the transmitting wires required, normal condition of transmission circuit — that is whether normally energised or not — the use of relay chains or rotary selectors in parallel or in series, and the recording and storing of controls and return indications.

Mr. TRIBELHORN *(Swiss Federal Railways)* thought that it was desirable to emphasise that the text referred to the installations in use at present. In several years there would certainly be many more installations in use.

Mr. DARGEOU said that the original text covered the wishes of Mr. TRIBELHORN.

The PRESIDENT remarked that no mention was made of the possibilities of C.T.C. (e.g. number of kilometres per operator).

Mr. CIRILLO stated that it is very difficult to fix a figure, because this depends on local circumstances.

Finally, the original text of *Summary No. 9* was approved without modification.

Summary No. 10 :

10. The capacity offered by remote control systems and their flexibility from the point of view of future extensions fall to be considered under various aspects :

1) the number of subsidiary locations capable of being controlled along a length of line; 2) the number of controls and return indications available for each such subsidiary locations; 3) capacity of the system and the line circuits to transmit without delays adversely affecting the flexibility of the working, the number of controls and return indications rendered necessary by the density of the traffic and characteristics of the remote control equipment itself. This last consideration is of great importance in areas where there is heavy traffic and of such a character as to indicate it as advisable to adopt quicker working systems, or systems using more wires or transmission channels.

— This Summary was approved without remark.

Summary No. 11 :

11. Some Railways allow for having at remotely controlled locations on heavy worked lines a local control frame or « panel » either to control local traffic operations after disconnecting the remote control, or to enable the locations to be worked locally when the remote control is out of order.

In the small stations, it is customary to be satisfied with providing for local operation of points on the ground, either electrically or manually effected according to the particular regulations in force, either by the train crews or the staff at the station.

Mr. TOLOTTI thought that the electrical operation of points locally on the ground was exceptional and that manual operation was general.

He proposed that the second paragraph should be amended.

Mr. MAXWELL said that he would like to make it clear that his previous reference

to 100 % reliability of remote control apparatus was not meant to suggest any doubts as to the abilities of the Signal Engineers on grounds of safety. But it was no use the Signal Engineers guaranteeing safety of train working if the remote control equipment were liable to frequent failure, which would bring peak hour services of 40 trains per hour to a standstill. Until this possibility was made reasonably remote on urban lines with heavy traffic, he suggested that it was not good enough to await the arrival on site of maintenance staff, who might take 10 or 15 minutes to arrive : for this reason some of the original local electrical equipment had been retained for emergency working.

Mr. Langevin *(Régie Autonome des Transports Parisiens)* associated himself with the remarks of Mr. Maxwell and considered the provision of local electrical operation of points indispensable in such Regions with heavy traffic.

Mr. Tolotti accepted the text proposed by the *Special Reporter* and *Summary No. 11* was adopted.

Summary No. 12 :

12. The maintenance and upkeep of remote control installations do not appear to offer any special difficulties. Failures of the equipment itself are very few, thanks to the progress made in their design and construction. The tendency is to group relays together in suitable assemblies in dust-proof cases with plug-in type connectors. This enables any assembly to be replaced by a spare one in a few seconds. The period of regular overhaul of equipment varies with the amount of work each group of apparatus is required to perform, according to the density of the traffic.

— This Summary was adopted.

The President then thanked the delegates present for their participation in the debates and stated that the next meeting would be held at 9.0 a.m. the following day, in the *Convocation Hall.*

Meeting held on the 21th May, 1954.

The President opened the Session and asked Mr. Nogués *(Special Reporter)* to give a résumé of his Report on Question 6 B : « *Electric working and control devices for hinged and « flexible » points and switches. Control of accidental trailing of the switch blade.* »

M. Nogués in doing so indicated that the replies to the questionnaire had not discriminated between heeled and heel-less switches.

Mr. Fraser requested that after the heading of paragraph « B » and before the summaries themselves, the following paragraph should be added :

« — This question excludes points operated pneumatically even if controlled electrically. »

Mr. Walter considered that before the discussions, it would be useful to stress that points could be arranged in three distinct classes :

a) Main lines or Subsidiary lines;

b) Trailable or non-trailable;

c) Heel-less or heeled.

On the invitation of the President, M. Nogués read *Summary No. 1 :*

Point machines.

1. It is usual to adopt motors capable of rotating in either direction as required.

Various types of mechanism are used to convert the rotary into a straight line movement; eccentrically shaped cams, spur gear, rack drives and worm and crank drives.

The amount of movement, operating stroke, and force required differ, generally speaking, according to whether ordinary heeled points, marshalling yard points, or « flexibles » points are concerned.

Mr. WALTER requested that the last paragraph should be amended as follows :

« The amount of movement, operating stroke and force required differ, generally speaking, according to whether the points are on main lines or subsidiary lines, are trailable or non-trailable, heel-less or heeled. »

— The text was adopted with this alteration.

Mr. NOGUÉS read *Summaries Nos. 2 and 3 :*

Summaries Nos. 2 and 3 :

2. *Operating current :* The current used to operate the points is that obtained in the most economic manner in the particular locality and continuity of supply must always be assured. Some of the electrified railways use any convenient kind of current for the point motors, but on the other hand, others make a practice of employing systematically a type of current distinct from that used for traction purposes.

3. *Point detection circuits :* All types of current are accepted for use in connection with point detection, but low voltage D.C. appears to be the most frequently used. Some Railways use a type of current different from that employed for traction purposes.

The last paragraph of point 2 gave rise to discussion.

Mr. WALTER remarked that when his Administration installed automatic block signalling on an electrified line, it was obliged to adopt for track circuits a type of current different from the traction. It was natural, therefore, that this type of current should be used for point motors.

The S.N.C.F. thus occupied a position intermediate between the cases mentioned in the summaries.

Mr. TOLOTTI indicated that Italy had important installations of D.C. electric traction with point layouts operated by D.C.

This arrangement had not caused any trouble nor any faults affecting safety.

Mr. TOLOTTI suggested that there was no necessity to control point machines by a type of current different from the traction current.

— Following discussion, it was decided to eliminate from the last sentence in *Summary No. 2*, the words : « but on the other hand, others make... for traction purposes ».

Mr. FRASER was surprised to learn that for point detection low voltage D.C. was most frequently used. In Great Britain A.C. was used whenever it was available, that is in the majority of cases.

The PRESIDENT, having asked if any other countries followed this practice, Mr. TOLOTTI stated that, in Italy, 144 volts D.C. or 150 volts A.C. were used as convenient.

The PRESIDENT asked Mr. FRASER if, in his country, the same current was used systematically for operation and detection, *i.e.*, on power schemes.

Mr. Fraser replied that in Great Britain separate circuits were used for operation and detection, the latter being A.C. whenever a suitable supply was available.

Mr. Tolotti observed that continuity of supply should be assured for detection as well as for operation.

Mr. Guthrie *(Coras Iompair Eireann, Ireland)* doubted whether continuity of supply need always be assured.

For example, in the case of a remote junction with light traffic, he considered that the provision of a standby supply was not always necessary.

He proposed that the second paragraph of *Summary No. 2* should be completed by the addition of the following words :

« ...should generally be assured for installations with heavy traffic. »

— This modification was adopted, and the text of *Summary No. 2* becomes :

« 2. *Operating current.* — The current used to operate the points is that obtained in the most economic manner in the particular locality, and continuity of supply should generally be assured for installations with heavy traffic. Some of the electrified railways use any convenient kind of current for the point motors. »

— *Summary No. 3* remained unchanged.

Summary No. 4 :

Point locking and bolting.

4. The general practice is to connect the bolting or locking mechanism of electrically worked points directly to the operating portion, thus avoiding having to have separate bolting arrangements. Opinions vary however as to the way in which such bolting should be effected. Certain Administrations provide direct locking of the point tongues to the stock rails with the aid of a point tongue bolt, functioning with the operating mechanism of the points. This bolt can be trailable or not according to the practice of the particular Administration respecting the trailability of points. Other Administrations bolt the operating rod or rods or it may be the point detector connecting rods acting with the tongues by means of kinematical devices contained in the point machine mechanism.

Mr. Tolotti requested that the words below should be added in the last paragraph :

« ...tongues for trailable points... »

The words « kinematical devices » in the English text should be « moving parts ».

— Adopted with this alteration.

Summary No. 5 :

Point detection.

5. The most usual practice is to prove, by means of an electrical contact maker of circuit controller placed inside the equipment :

(*a*) that the point operating rod (or the two rods where each tongue is operated separately) has completed its stroke; and (*b*) that these rods are held and bolted by some interior mechanism which is non-reversible.

For points in main running lines taken in the facing direction, most Administrations complete these arrangements by an additional equipment comprising contacts actuated directly by the tongues themselves, in order to make certain that the closed tongue is effectively in place and tight home and that the other tongue is open properly at the correct distance. These point tongue detecting contacts may be inside or outside the point machine. Certain Administrations use these additional arrangements only in the case of points taken facing at high speeds.

These types of detection are found in modern power signalling installations under the form of « positive » or « constant » detection giving permanent control over the operation of the signals.

Mr. FRASER asked that in the English text the words « positive or » should be eliminated in the last paragraph.

— *Summary No. 5* was adopted with this alteration.

Summary No. 6 :

Local operation of points.

6. All modern electric point operating arrangements allow of effecting when desired local manual operation of points on the ground by means of either a crank handle or lever.

As a rule, putting the handle in position for manual operation interrupts the feed to the machine. During such manual operation, the detection which indicates the position of the points in the signal box and their agreement or otherwise with the control line lever there, continues to function.

Mr. FRASER indicated a point that had not been clearly defined.

In Great Britain, for remote junctions where a crank handle was used at the site, this was interlocked with the signals.

Mr. TOLOTTI considered that the construction of the last phrase « During such manual operations... » could be improved.

Mr. NOGUÉS remarked that the absence of detection is an important part of the principle of detection as it prevents the clearance of the signal.

After a long discussion in which Messrs. MARCHAND, DEVILLERS *(Belgian National Railways)*, DE BLIECK *(Netherlands Railways)* and FRASER took part, it was decided *to maintain the text proposed by the Special Reporter.*

Mr. NOGUÉS read *Summary No. 7 :*

7. Some Administrations find it advantageous for traffic operating purposes to install, in certain cases, local individual operation of the points. Such local actuation requires the permission of the central controlling box or station before it can be put into operation.

Mr. NOGUÉS asked that the word « electrical » should be added after the word « individual » :

Mr. MARCHAND stated that two cases should be considered :

a) points operated either remotely from the signal box, or locally for shunting movements;

b) points always operated locally.

Mr. NOGUÉS reminded the delegates that *Summary 7* only concerned electrically operated points.

Mr. MARCHAND regretted that the scope had been limited but he agreed that this was not the moment to extend the subject.

— *Summary No. 7* was adopted.

Summary No. 8 :

Protection against irregular action of point machines.

8. Special measures are taken to make any irregular operation of point machines practically impossible and to exclude any false detection or return indications.

The principal arrangements that may be adopted for this purpose are :

— use of wires and cables of high insulating quality answering to very strict specifications;

— frequent inspection and measurement of the insulation resistance of a circuit and use of « earth » detectors;

— suitable arrangement of the electrical connections and wiring so rendering it impossible for them to become altered or rendered defective in the course of maintenance work;

— satisfactory arrangement of all control and detection circuits in such a way as to reveal any defect in insulation that can arise and prevent any possible extraneous current from putting the point machine in motion;

— use of suitable types of current in the detection circuits according to the kind of induced current that can be met with in each case.

Mr. Walter asked that the words « induced currents » should be changed for « stray currents ».

Brig. Ch. A. Langley *(Ministry of Transport & Civil Aviation, Great Britain)* requested that the text of the fifth paragraph be amended thus :

« suitable arrangement and design of the electrical equipment and connections and wiring, both internal and external, so rendering it impossible for them to become altered or rendered defective in the course of maintenance work and testing. »

— *Summary No. 8* was adopted with these two amendments.

Summary No. 9 :

Accidental trailing through of points.

9. Opinions are divided on the question of using trailable devices to prevent damage to the points themselves or to their electro-mechanical operating mechanism. Some Administrations limit their use to marshalling yard tracks and certain subsidiary ones. On the other hand, others make use of the trailability feature for electrically operated points as a general practice on main running lines, save, sometimes, in the case of points with « flexible » tongues.

Some Administrations follow a kind of middle course in this matter. On main running lines, they give preference to the non-trailable point machines, on condition that there is a proper arrangement of fixed signals to protect the points which require to be taken from the trailing direction, but where such signalling is not provided then trailable equipment is adopted, which reduces to the minimum interruptions to the traffic and does not require the presence of special staff to make good any damage, such as results from trailing through points in the wrong direction.

— This Summary was adopted without alteration.

Summary No. 10 :

10. It is the usual practice to indicate in the signal box when a pair of points becomes trailed through, whether they are actually of the trailable type or not, by means of a visual indicator, often supplemented by an audible indication. On main running lines, it is recommended to make such detection of the « positive » or « constant » type.

Certain Administrations use counters to record the number of times points are trailed.

This was adopted, but in the English text the words « positive or » were eliminated.

Summary No. 11 :

11. In the case of trailable equipment on main running lines the unbolting of points which are being run through is ordinarily brought about by the action of the wheel on the open tongue, the first of the two to become displaced during such movement.

In the case of points in marshalling yards and secondary lines, simpler apparatus can be used based on the use of springs.

— Adopted.

Summary No. 12 :

12. Non-trailable equipment is generally provided with some part which becomes permanently deformed or broken during trailing; this localises the action and limits the resultant damage.

The PRESIDENT stated that on the « Deutsche Bundesbahn » a particular device cut the current from the point machine after 6 seconds when the completion of the stroke cannot be effected owing to the presence of an obstruction.

After discussion in which Messrs. TOLOTTI and FRASER took part, it was decided that this question was not within the framework of the subject under discussion and *Summary No. 12* was adopted.

— The meeting closed at 11.0 a.m.

— The complete text of the Summaries adopted is as follows :

SUMMARIES.

A. — Remote operation of signal boxes: technical realizations, working orders.

« 1. Remote control of signalling instal- « ations is becoming more and more « extended and is developing along two « distinct lines: *(a)* remote control of « stations, as a rule small ones, *situated « along a line* (C.T.C.); *(b)* remote « control of groups of points and signals « in large stations, situated in areas some « distance away, or of the equipment at « junctions and crossings between lines, « such control being effected from a « neighbouring station.

« 2. On *single* line, C.T.C. is being « applied in order to increase the capacity « and flexibility of the working on heavily « trafficked routes in order to avoid « having to double the line, or to effect « a reduction in the staff ordinarily on « duty at the stations. The results obtain- « ed under both these aspects depend « on the methods of working adopted in « the various countries and the conditions « obtaining previously on each line in « question.

« If these results are important on lines « operated by the dispatching system « with train order, they are generally « more reduced on other lines notably « when they are equipped with a dis- « patching system, and when the opera- « tion of points and signals is effected by « station staff from the station buildings.

« 3. C.T.C. is to be recommended on « *double lines* when it is a question of « adopting reversible working on each « track in order to obtain greater traffic « capacity, or to avoid having to lay « down additional lines. The best results « are obtained when the periods of maxi- « mum traffic load on the two tracks do « not coincide and the number of cases « of trains having to be put into a siding « for another to pass is large on account « of a number of trains following each « other at differing speeds.

« 4. Remote control applied to the « electric operation of points and signals « *individually or by route* locking in the « outer areas of large stations or at « nearby junctions, etc. allows of extend- « ing in an economic manner the radius « of action of signal boxes to cover very « considerable areas.

« The saving in first cost depends on « the balance obtained between the

« reduction in the cost of cabling and « that of providing the remote control « equipment. This saving becomes more « noticeable as the number of items of « apparatus remotely controlled at each « location increases and as their distance « from the central controlling apparatus « becomes greater.

« Concentrating the remote control of « the operation of points and signals in « large areas allows of suppressing the « large number of staff otherwise requir- « ed. This gives rise to savings in staff « and greater capacity and flexibility of « working.

« 5. Lines or areas remotely controlled « are always provided with track circuit- « ing, or equivalent apparatus, such as « axle counters, to check up the occupa- « tion of the tracks and register the « movements of trains.

« Generally such installations are com- « pleted by having automatic signalling « applied to them, taking advantage of « the presence of track circuiting.

« Only those signals which protect « points are habitually remotely con- « trolled as regards their absolute stop « indications.

« 6. The systems most generally used « for remote control transmission are « those employing D.C. impulses, which « can differ as regards the duration of the « impulses and cuttings or concerning the « polarity of the impulses.

« The so-called « time code » system « (code of short and long impulses) is the « one most used in C.T.C.

« The polarized impulse systems and « the induced impulse systems seem to « be preferred where rapidity of trans- « mission becomes an important factor.

« 7. Safety interlocking arrangements « in remotely controlled installations are « habitually effected at the subsidiary « lineside locations and are consequently « independent of the remote control « itself. In this way, any error or defect « in the transmission of a control or a « return indication has no effect on the « safety of the working.

« 8. The numerous relays used in « remote control installations are more « similar in type to telephone type relays « than to signalling relays, but an « endeavour is made to improve their « quality and characteristics by a finer « degree of manufacture, using improved « up-to-date processes and sometimes by « making them larger and more robust « than actual telephone relays.

« 9. These installations are widely used « in the United States. Nevertheless, « experience gained by most of the « managements concerned does not ap- « pear as yet to be sufficient by reason of « the small number of installations in use « and the short lengths of time they have « been in service, to enable any final « general conclusions to be reached as « to the preference to be accorded to this « or that way of carrying out a remote « control system, such as the number and « function of the transmitting wires « required, normal conditions of trans- « mission circuit — that is whether « normally energised or not — the use « of relay chains or rotary selectors in « parallel or in series, and the recording « and storing of controls and return « indications.

« 10. The capacity offered by remote « control systems and their flexibility « from the point of view of future exten- « sions fall to be considered under various « aspects :

« 1) the number of subsidiary locations « capable of being controlled along a « length of line; 2) the number of con- « trols and return indications available « for each such subsidiary location; « 3) capacity of the system and the line « circuits to transmit without delays « adversely affecting the flexibility of the « working, the number of controls and « return indications rendered necessary « by the density of the traffic and charac- « teristics of the remote control equip- « ment itself. This last consideration is « of great importance in areas where « there is heavy traffic and of such a « character as to indicate it as advisable « to adopt quicker working systems, or « systems using more wires or trans- « mission channels.

« 11. Some Railways allow for having « at remotely controlled locations on « heavy worked lines a local control « frame or « panel » either to control « local traffic operations after disconnect- « ing the remote control, or to enable the « locations to be worked locally when the « remote control is out of order.

« In the small stations, it is customary « to be satisfied with providing for local « operation of points on the ground, « either electrically or manually effected « according to the particular regulations « in force, either by the train crews or the « staff at the station.

« 12. The maintenance and upkeep of « remote control installations do not « appear to offer any special difficulties. « Failures of the equipment itself are « very few, thanks to the progress made « in their design and construction. The « tendency is to group relays together in « suitable assemblies in dustproof cases « with plug-in type connectors. This « enables any assembly to be replaced by « a spare one in a few seconds. The « period of regular overhaul of equip- « ment varies with the amount of work « each group of apparatus is required to « perform, according to the density of « the traffic.

B. — Electric working and control devices for hinged and « flexible » points and switches. Control of accidental trailing of the switch blade.

Note. — « This question excludes point operated pneumatically even if controlled electrically. »

Point machines.

« 1. It is usual to adopt motors capable « of rotating in either direction as « required. Various types of mechanism « are used to convert the rotary into a « straight line movement; eccentrically « shaped cams, spur gear, rack drives « and worm and crank drives.

« The amount of movement, operating « stroke and force required differ, gener- « ally speaking, according to whether the « points are on main lines or subsidiary « lines, are trailable or non-trailable, « heel-less or heeled.

« 2. *Operating current.* — The current « used to operate the points is that « obtained in the most economic manner « in the particular locality, and continuity

« of supply should generally be assured « for installations with heavy traffic. « Some of the electrified railways use any « convenient kind of current for the « point motors.

« 3. *Point detection circuits.* — All types « of current are accepted for use in con- « nection with point detection, but low « voltage D.C. appears to be the most « frequently used. Some Railways use « a type of current different from that « employed for traction purposes.

Point locking and bolting.

« 4. The general practice is to connect « the bolting or locking mechanism of « electrically worked points directly to « the operating portion, thus avoiding « having to have separate bolting arran- « gements. Opinions vary however as to « the way in which such bolting should « be effected. Certain Administrations « provide direct locking of the point « tongues to the stock rails with the aid « of a point tongue bolt, functioning with « the operating mechanism of the points. « This bolt can be trailable or not accord- « ing to the practice of the particular « Administration respecting the trail- « ability of points. Other Administrations « bolt the operating rod or rods, or it « may be the point detector connecting « rods acting with the tongues, by means « of moving parts contained in the point « machine mechanism.

Point detection.

« 5. The most usual practice is to prove, « by means of an electrical contact maker « or circuit controller placed inside the « equipment :

« *(a)* that the point operating rod (or « the two rods where each tongue is « operated separately) has completed its « stroke; and

« *(b)* that these rods are held and « bolted by some interior mechanism « which is non-reversible.

« For points in main running lines « taken in the facing direction, most « Administrations complete these arran- « gements by an additional equipment « comprising contacts actuated directly « by the tongues themselves, in order to « make certain that the closed tongue is « effectively in place and tight home and « that the other tongue is open properly « at the correct distance. These point « tongue detecting contacts may be inside « or outside the point machine. Certain « Administrations use these additional « arrangements only in the case of points « taken facing at high speeds.

« These types of detection are found in « modern power signalling installations « under the form of « constant » detec- « tion giving permanent control over the « operation of the signals.

Local operation of points.

« 6. All modern electric point operating « arrangements allow of effecting when « desired local manual operation of « points on the ground by means of « either a crank handle or lever.

« As a rule, putting the handle in « position for manual operation interrupts « the feed to the machine. During such « manual operation, the detection which « indicates the position of the points in « the signal box and their agreement or « otherwise with the control line lever « there, continues to function.

« 7. Some Administrations find it « advantageous for traffic operating purposes to install, in certain cases, local « individual electrical operation of the « points. Such local actuation requires « the permission of the central controlling « box or station before it can be put into « operation.

Protection against irregular action of point machines.

« 8. Special measures are taken to « make any irregular operation of point « machines practically impossible and to « exclude any false detection or return « indications.

« The principal arrangements that may « be adopted for this purpose are:

« — use of wires and cables of high insulating quality answering to very strict « specifications;

« — frequent inspection and measurement of the insulation resistance of a « circuit and use of « earth » detectors;

« — suitable arrangement and design of « the electrical equipment and connections and wiring, both internal and « external, so rendering it impossible for « them to become altered or rendered « defective in the course of maintenance « work and testing;

« — satisfactory arrangement of all control and detection circuits in such a « way as to reveal any defect in insulation « that can arise and prevent any possible « extraneous current from putting the « point machine in motion;

« — use of suitable types of current in the « detection circuits according to the kind « of stray current that can be met with « in each case.

Accidental trailing through of points.

« 9. Opinions are divided on the « question of using trailable devices to « prevent damage to the points themselves « or to their electro-mechanical operating « mechanism. Some Administrations « limit their use to marshalling yard « tracks and certain subsidiary ones. On « the other hand, others make use of the « trailability feature for electrically operated points as a general practice on « main running lines, save, sometimes, in « the case of points with « flexible » « tongues.

« Some Administrations follow a kind « of middle course in this matter. On « main running lines, they give preference « to the non-trailable point machines, on « condition that there is a proper arrangement of fixed signals to protect the « points which require to be taken from « the trailing direction, but where such « signalling is not provided then trailable « equipment is adopted, which reduces « to the minimum interruptions to the « traffic and does not require the presence « of special staff to make good any « damage, such as results from trailing « through points in the wrong direction.

« 10. It is the usual practice to indicate « in the signal box when a pair of points « becomes trailed through, whether they « are actually of the trailable type or not, « by means of a visual indicator, often « supplemented by an audible indication. « On main running lines, it is recommended to make such detection of the « « constant » type.

« Certain Administrations use counters « to record the number of times points « are trailed.

« 11. In the case of trailable equipment

« on main running lines the unbolting « of points which are being run through « is ordinarily brought about by the « action of the wheel on the open tongue, « the first of the two to become displaced « during such movement.

« In the case of points in marshalling « yard and secondary lines, simpler « apparatus can be used based on the « use of springs.

« 12. Non-trailable equipment is gene- « rally provided with some part which « becomes permanently deformed or « broken during trailing; this localises « the action and limits the resultant « damage. »

— These Summaries were ratified by the Plenary Meeting on May 25.

SECTION IV. — General.

President : Dr. G. RENZETTI.
Vice-Presidents : M. DIAS TRIGO, F. CH. BADHWAR and E. G. J. UPMARK
Principal Secretary : H. LENFANT.

QUESTION 7.

Modernisation of the methods to be adopted for recruiting the staff in number and qualification.

Harmonious renewal of the various ranks, indispensable reserve lists, ratio of the permanent and temporary staff.

Part played by the medical service in the recruiting.

Preliminary documents.

Report (America (North and South), Australia (Commonwealth of), Burma, Ceylon, Denmark, Egypt, Finland, India, Indonesia, Irak, Iran, Republic of Ireland, New Zealand, Norway, Pakistan, South Africa, Sweden and the United Kingdom of Great Britain and Northern Ireland and the territories for whose international relations the United Kingdom is responsible, by Frank LEMASS. (See *Bulletins* for November 1953, p. 837, and for December 1953, p. 985, or separate issue No. 10.)

Report (Austria, Belgium and Colony, Bulgaria, Czechoslovakia, France and French Union, Germany, Greece, Hungary, Italy, Luxemburg, Netherlands, Poland, Portugal and Colonies, Rumania, Spain, Switzerland, Syria, Turkey and Yugoslavia), by Dr. A. HUYBERECHTS and R. BERGHMANS. (See *Bulletin* for January 1954, p. 45, or separate issue No. 17.)

Special Report by F. LEMASS (See *Bulletin* for May 1954, p. 552.)

Report of Section IV.

(See the *Congress Daily Journal* No. 2, pp. 8/9; No. 3, pp. 7/8 and No. 5, p. 9.)

Meeting held on the 20th May, 1954.

The PRESIDENT called on Mr. F. LEMASS, *Special Reporter*, who gave a Summary of his Special Report.

Messrs. UPMARK *(Swedish State Railways and Vice-President)* and LALONI *(Italian State Railways)* would like to have seen the question of output and industrial productivity, which are connected with the staff question, included on the agenda.

Mr. LALONI suggested that this question should be examined at some future meeting of the Congress.

The Section started then the examination of the Summaries.

Summary No. 1 :

1. It is essential to establish a long term plan to ensure in a suitable and harmonious manner the recruitment of administrative, technical and supervisory staffs.

This plan must meet any new situations resulting from progress in working methods (modernisation, rationalisation, etc.) and changes in social conditions, and be so conceived that it will not cause any lack of balance in the constitution of the various ranks of permanent staffs.

Several delegates and in particular Messrs. BOURRIE *(French National Railways)*, SANTONI *(Italian State Railways)*,

LALONI *(Italian State Railways)*, HUYBERECHTS, *Reporter*, and LEMASS, *Special Reporter*, stressed the difficulties involved in drawing up a strict plan.

Summary No. 1 was adopted with the following alteration :

« It is highly desirable to establish a long term plan to ensure in a suitable and harmonious manner, the recruitment of administrative, technical and supervisory staffs.

« This plan must meet any new situations resulting from progress in working methods (modernisation, rationalisation, etc.) and changes in social conditions, and be so conceived that it will not cause any lack of balance in the constitution of the various ranks of permanent staffs. »

Summary No. 2 :

2. The objectives of the plan can be attained by regular recruitment, even in the absence of imminent vacancies, and also by the formation of a reserve pool of suitably trained persons.

Though in principle in agreement with the text, certain delegates pointed out the difficulties involved in recruitment which did not take into account the evolution in methods of working (electric traction, diesel, etc.).

The following delegates took part in the discussion : Messrs. VALDIVIESO *(Italian State Railways)*, BOURRIE, SJÖBERG *(Swedish State Railways)*, BADHWAR *(Railway Board, India and Vice-President)*, UPMARK, REYMAO NOGUEIRA *(Portuguese Railways)*, LEMON *(East African Railways and Harbours)*, LEMASS and PAPALEXANDROU *(Greek State Railways)*.

Following a proposal put forward by Mr. MCLEOD *(British Railways)* the following text was adopted :

« 2. The objectives of this plan can be attained by regular recruitment and by suitable selection and training of a sufficient number of staff to fill prospective vacancies in administrative and technical posts. »

Summary No. 3 :

3. An establishment which includes temporary employees should have their number limited to those needed for economical working.

This Summary was adopted without any alteration. However, an alteration was made to the French version to make it agree with the English text.

Summary No. 4 :

4. Greater importance should be given to selection of staff in order to ensure that the best of the applicants are selected.

The character, intellect and aptitude of each applicant should receive special attention.

As far as possible temporary staff should be recruited in an identical manner to permanent staff.

On a suggestion put forward by Messrs. BOURRIE and ROUSSEAU *(International Railway Union)*, the text was adopted as follows :

« 4. Greater importance should be given to the selection of staff in order to ensure that the best of the applicants are selected.

« The character, intellect and aptitude of each applicant should receive special attention.

« As far as possible the recruitment of temporary staff should be done on similar

lines to those followed when engaging permanent staff. »

Summary No. 5 :

5. A proper method of selection should include the following :

(*a*) job specification — at least for technical and supervisory staff and skilled workers;

(*b*) application form;

(*c*) examination;

(*d*) interview;

(*e*) psychological examination — at least applied to staff concerned with safety on the undertaking;

(*f*) comprehensive medical examination.

Several members agreed that the text of the Summary referred both to selection from within and outside the railways.

Mr. BOURRIE suggested that competitive examination should be added to paragraph *c*).

Mr. DI LULLO *(Italian State Railways)* stressed the importance of both the medical and the psychological examination.

The following text was adopted :

« 5. A proper method of selection should include the following :

« *a*) job specification — at least for technical and supervisory staff and skilled workers;

« *b*) application form;

« *c*) examination and competitive examination;

« *d*) interview;

« *e*) psychological examination — at least applied to staff concerned with safety on the undertaking;

« *f*) comprehensive medical examination. »

Summary No. 6 :

6. When there are open examinations, priority or additional marks should be given to existing personnel.

Mr. ALLEN *(British Railways)* was against the idea of any advantages being given to existing staff in the form of additional marks.

Mr. LEMASS, *Special Reporter* stated that he had drafted this Summary as a result of the replies he had received from the different Administrations.

Following remarks made by the PRESIDENT and Messrs. BOURRIE and ALLEN it was decided that *Summary No. 6 should be deleted.*

Summary No. 7 (which becomes No. 6) :

7. It is desirable that, when possible, there should be post-appointment training of staff. If there is a probationary period such training would come at the end of that period.

Pre-appointment training is essential for operating staffs.

A discussion took place on the training which should be given to the staff either before or after appointment.

After an exchange of views between Messrs. BERGHMANS, *Reporter*, VALDIVIESO, LEMASS, BOURRIE and NOLET DE BRAUWERE *(Belgian National Railways)* the following text was adopted :

« 6. It is desirable that where possible there should be training of staff.

« Pre-appointment training is essential at least for operating staffs. »

— The meeting was adjourned at 12 o'clock.

Meeting held on the 21st May, 1954.

— The meeting opened at 9.0 a.m. and the Section continued the examination of the Summaries.

Summary No. 8 (which becomes No. 7) :

8. Some encouragement should be given to the staff to attend, if possible, universities or technical schools outside working hours in suitable courses. Alternatively arrangements might be made to provide such technical training within the undertaking.

An exhange of views then took place between the President, Messrs. Lemass, *Special Reporter*, and Plumridge *(Nigerian Railway)* on the advantage of having courses either within the railways or in technical schools and universities outside the undertaking which could possibly be attended by staff during working hours.

The meeting adopted the proposed French text without any alteration, but a slight modification was made to the English version.

« 7. Encouragement should be given to the staff to attend, if possible, universities or technical schools outside working hours in suitable courses. Alternatively arrangements might be made to provide such technical training within the undertaking. »

Summary No. 9 (which becomes No. 8) :

9. Ability should be the only criterion in promotion of staff. It is only when the qualifications of candidates in this respect are equal that the senior one should be appointed.

Points were raised by Messrs. Neil *(British Railways)*, Berghmans, Lemon, Bourrie, Luu Van Phong *(Régie des Chemins de fer non concédés du Viêt-Nam)*, Lemass, Badhwar, Laloni, in connection both with the French and English text, and the following text was adopted :

« 8. Suitability should be the only criterion in promotion of staff. It is only when the qualifications of candidates in this respect are equal that the senior one should be appointed. »

Summary No. 10 (which becomes No. 9) :

10. It is to be noted that while the standard of fitness required on entry into employment is very similar on most undertakings, there are wide divergencies of practice regarding periodical medical examinations of employees.

It would be advisable for the chief medical officers of the various undertakings to meet in order, if possible, to agree on practices and standards in this matter, and also to offer advice on the question of the age for retirement.

The President suggested that the two paragraphs of this conclusion should be examined separately.

There was no discussion on the first paragraph.

In connection with the second paragraph, Mr. Huyberechts hoped that a greater number of Railway Administrations would adhere to the International Union of Railway Medical Services.

Messrs. McLeod, Laloni, Bourrie, Huyberechts and Manitto Torres *(Benguela Railways)* stated that the medical officers could not, in their opinion, give any advice on the question of the age for retirement as this depended on the particular social and economic conditions of each undertaking.

The following text was adopted :

« 9. It is to be noted that while the standard of fitness required on entry into employment is very similar on most undertakings, there are wide divergencies of practice regarding periodical medical examinations of employees.

« It would be advisable for the chief medical officers of the various undertakings to study, in common, practices and standards in this matter. »

Summary No. 11 :

11. Employees resigning from the service should be interviewed to ascertain reasons for leaving.

Certain delegates, and in particular Messrs. LALONI and BOURRIE, were of the opinion that this Summary could be deleted.

Mr. LEMASS, *Special Reporter*, stated that he had introduced it as a result of the replies he had received from the various undertakings.

Messrs. BADHWAR and LUU VAN PHONG were in favour of retaining this Summary.

As a result of the vote which then took place, it was decided to *delete Summary No. 11.*

— The Meeting then started the study of Question 8.

— The complete text of the Summaries for Question 7 is the following :

SUMMARIES.

« 1. It is highly desirable to establish « a long term plan to ensure in a suitable « and harmonious manner, the recruit- « ment of administrative, technical and « supervisory staffs.

« This plan must meet any new situations « resulting from progress in working « methods (modernisation, rationalis- « ation, etc) and changes in social condi- « tions, and be so conceived that it will « not cause any lack of balance in the « constitution of the various ranks of « permanent staffs.

« 2. The objectives of this plan can be « attained by regular recruitment and by « suitable selection and training of a « sufficient number of staff to fill pros- « pective vacancies in administrative and « technical posts.

« 3. An establishment which includes « temporary employees should have their « number limited to those needed for « economical working.

« 4. Greater importance should be given « to the selection of staff in order to « ensure that the best of the applicants « are selected.

« The character, intellect and aptitude « of each applicant should receive special « attention.

« As far as possible the recruitment of « temporary staff should be done on « similar lines to those followed when « engaging permanent staff.

« 5. A proper method of selection « should include the following :

« *(a)* job specification — at least for « technical and supervisory staff and « skilled workers;

« *(b)* application form;

« *(c)* examination and competitive « examination;

« *(d)* interview;

« *(e)* psychological examination — at « least applied to staff concerned with « safety on the undertaking;

« *(f)* comprehensive medical examin- « ation.

« 6. It is desirable that where possible « there should be training of staff.

« Pre-appointment training is essential « at least for operating staffs.

« 7. Encouragement should be given « to the staff to attend, if possible, univer- « sities or technical schools outside work- « ing hours in suitable courses. Alterna- « tively arrangements might be made to « provide such technical training within « the undertaking.

« 8. Suitability should be the only « criterion in promotion of staff. It is « only when the qualifications of candi- « dates in this respect are equal that the « senior one should be appointed.

« 9. It is to be noted that while the « standard of fitness required on entry « into employment is very similar on « most undertakings, there are wide « divergencies of practice regarding per- « iodical medical examinations of em- « ployees.

« It would be advisable for the chief « medical officers of the various under- « takings to study, in common, practices « and standards in this matter. »

— The Plenary Meeting ratified these Summaries on the 25th May, 1954.

QUESTION 8.

Determination of the principles of geographical and functional organisation of a railway system. Simplification and retrenchment of the administration of railways.

Preliminary documents.

Report (America (North and South), South Africa, Australia (Commonwealth of), Burma, Ceylon, Denmark, Egypt, Finland, India, Indonesia, Iran, Iraq, Republic of Ireland, Norway, New Zealand, Pakistan, United Kingdom of Great Britain and Northern Ireland and the territories for whose international relations the United Kingdom is responsible, and Sweden), by Bengt ADAMSON, (See *Bulletin* for September 1953, p. 573 and *Bulletin* for October 1953, p. 729, or separate issue No. 4).

Report (Germany, Austria, Belgium and Colony, Bulgaria, Spain, France and the French Union, Greece, Hungary, Italy, Luxemburg, Netherlands, Poland, Portugal and Colonies, Rumania, Switzerland, Syria, Czechoslovakia, Turkey and Yugoslavia), by René DUGAS. (See *Bulletin* for December 1953, p. 949, or separate issue No. 14).

Special Report by R. DUGAS (See *Bulletin* for May 1954, p. 559).

Report of Section IV.

(See the *Congress Daily Journal :* No. 3, p. 8; No. 4, pp. 9/10; No. 5, p. 9.)

Meeting held on the 21st May, 1954.

After examination of the last Summaries for Question 7, at the beginning of the meeting, the Section started the study of Question 8.

The President called on Mr. Dugas, *Special Reporter*, who thanked the various undertakings for the replies given and particularly Mr. Adamson, *Reporter*, for the excellent report he had prepared.

The *Special Reporter* then gave a summary of the main points in his report.

Before going on to examine the Summaries, Mr. ADAMSON drew the attention of the delegates to the necessity to alter certain terms in the English text.

The meeting then went on to examine the Summaries, starting with Chapter I : Functional organisation.

Summaries Nos. 1 to 4 :

I. — *Functional organization.*

1. The principles and particularities of functional organization on different systems vary considerably as between the different Railway Administrations.

2. It does not seem to be possible to make an *a priori* decision, based on broad generally recognized principles of organization, that one fully elaborated type of organization for the whole of a particular system whatever that system may be, is to be preferred to all others. Only by detailed analysis of the application of these principles in each particular case can an opinion be given on the general solution which seems to be most suitable.

3. It also seems impossible to deduce, by means of a methodical analysis of the various forms of organization adopted by the various systems, that one form of organization is always and incontestibly preferable to every other form.

Every form of organization which has in fact been adopted by a Railway Administration has advantages and disadvantages. The fact that a form of organization proves satisfactory to a particular administration cannot be taken to imply that it can be recommended to another administration; the advantages and disadvantages must be weighed in each particular case.

4. Because it is impossible to refer cases to a single standard type or organization or even to a limited number of standard types of organization, a critical examination of a system's organization can only usefully be conducted by considering separately each group of activities for which there is only a small number of possible solutions in existence.

The observations set out above under points 2 and 3 on the subject of the overall organization of a system, apply equally well to detailed organization.

Mr. DUGAS proposed that *Summaries Nos. 1 to 4* should be grouped into one Summary.

Mr. SJÖBERG *(Swedish State Railways)* suggested that the staff should be mentioned as their activities were closely connected with the organisation of the undertakings.

The PRESIDENT requested him to submit a text which would be discussed at a future meeting.

The new *Summary No. 1* grouping the former *Summaries 1 to 4*, was adopted, with the following wording.

I — *Functional Organisation.*

« 1. The principles and particularities of functional organisation on different systems vary considerably as between the different Railway Administrations.

« It does not seem to be possible to make an *a priori* decision, based on broad generally recognised principles of organisation, that one fully elaborated type of organisation for the whole of a particular system whatever that system may be, is to be preferred to all others. Only by detailed analysis of the application of these principles in each particular case can an opinion be given on the general solution which seems to be most suitable.

« It also seems impossible to reduce, by means of a methodical analysis of the various forms of organisation adopted by the various systems, that one form of

organisation is always and incontestibly preferable to every other form.

« Every form of organisation which has in fact been adopted by a Railway Administration has advantages and disadvantages. The fact that a form of organisation proves satisfactory to a particular administration cannot be taken to imply that it can be recommended to another administration; the advantages and disadvantages must be weighed in each particular case.

« Because it is impossible to refer cases to a single standard type or organisation or even to a limited number of standard types of organisation, a critical examination of a system's organisation can only usefully be conducted by considering separately each group of activities for which there is only a small number of possible solutions in existence.

« The observations set out above on the subject of the over-all organisation of a system, apply equally well to detailed organisation. »

Summary No. 5 (which becomes No. 2):

5. It is useful to distinguish in a Railway Administration four levels corresponding to four general forms of activity. These are :

— the « ownership » level to which the general control of the undertaking belongs;

— the « administrative » level whose duty it is to determine general policy and the system's overall programme of work;

— the « management » level which is entrusted with the running of the system and the detailed working out of the programme, within the framework of the general instructions received from the level previously mentioned;

— the « executive » level whose duty it is to carry out this programme.

It is desirable that the four general functions mentioned above should be clearly defined and precisely allocated.

Mr. WANSINK *(Netherlands Railways)* stated that though he was not opposed to the proposed text, it could not apply to the Netherlands Railways.

Mr. ADAMSON pointed out that it was necessary to alter the terminology in certain parts of the English text.

A discussion then took place as to the desirability of dividing the various functions, as drafted in *Summary No. 2* (former *Summary No. 5*) into two groups. After a number of remarks it was decided that Messrs. DUGAS and UPMARK *(Swedish State Railways and Vice-President)* would jointly draft a new text which could be submitted at the next meeting.

— The meeting was adjourned at 11.45 a.m.

Meeting held on the 24th May, 1954.

The meeting was opened at 9.5 a.m.

Mr. DUGAS, *Special Reporter*, read out the new proposed text for *Summary No. 5*, which becomes *Summary No. 2.*

Various views regarding the text were given by Messrs. SANTONI, RUGIU *(Italian State Railways)*, LEMASS *(Coras Iompair Eireann, Ireland)* and BOSC *(Railways of Madagascar)*.

After Mr. DUGAS had given certain explanations, the following text was adopted :

« 2. It is useful to distinguish in a Railway Administration between four general functions. These are :

« — the higher control of the undertaking, which belongs to the « ownership » level;

— the determining of general policy and of the overall programme, which belongs to the « administrative » level;

— the management of the system and the working out of the programme of execution, within the framework of the general instructions received from the previous level, which belongs to the « management » level;

— the actual carrying out of that programme, which belongs to the « executive » level.

« Certain of the higher levels can be amalgamated into one.

« Whatever may be the allocation of duties between the different functions, it is desirable that these functions should be clearly defined and specifically allocated. »

Summary No. 6 (new No. 3) :

6. Apart from matters within the province of the Higher Administration and, ultimately, the Shareholders' General Meeting, the decisions on the organization of a system which, it appears, have to be considered the most carefully, are concerned with the following questions :

— at « administrative » level :

The determination of the powers to be delegated to the General Manager (or to the Managing Committee);

— at « management » level :

Whether to integrate the Headquarters Departments within the General Management or to make them into an additional supervisory body;

The grouping of activities at headquarters level, the number of chief officers to report to the General Manager (or Managing Committee) and, when occasion arises, the co-ordination of Departments by the Assistant General Managers and the separation of the essential activities on the one hand and the sections concerned with special centralized work on the other;

— at the « executive » level :

The number of intermediate supervisory bodies between headquarters and the local units;

The choice between a « functional » form of organization and a « geographical » form of organization;

The fixing of the respective duties of the chief officers at headquarters and the chief regional officers;

The grouping of activities at each « executive » level;

The delegation of powers to be made in respect of the different levels of the organization.

Various remarks regarding details were made by Messrs. LEMON *(East African Railways and Harbours)* and NOLET DE BRAUWERE *(Belgian National Railways)*, Mr. DUGAS agreed to the proposed amendments.

Summary No. 3 was adopted after alteration of the first paragraph as follows :

« 3. The decisions on the organisation of a system which, it appears, have to be considered the most carefully, are concerned with the following questions :... »

Then, the Meeting examined *Chapter II: Geographical organisation.*

Summary No. 7 (new No. 4) :

7. The particular forms of geographical organization of railway systems vary to a considerable extent between the different Railway Administrations.

— This Summary was adopted without alteration.

Summary No. 8 (new No. 5) :

8. The boundaries of every geographical area and the place chosen for its headquarters should meet the following requirements, as far as possible :

— they should allow for effective control throughout the area in question;

— they should reduce to a minimum the amount of co-ordination required with neighbouring areas;

— they should allow for easy contact between the area headquarters and the headquarters immediately superior to it in the organization;

— they should make for easy contact between the railway management on the one hand and the Public Authorities on the other.

After points had been raised by Messrs. Lemon, Lemass Manitto Torres *(Benguela Railways)* Dugas, Valdivieso *(Italian State Railways)* and Bosc, the following text was adopted :

« 5. The boundaries of every geographical area and the place chosen for its headquarters should meet the following requirements, as far as possible :

« — they should allow for effective control throughout the area in question;

« — they should reduce to a minimum the difficulties of liaison with neighbouring areas;

« — they should allows for easy contact between the area headquarters and the headquarters immediately superior to it in the organisation;

« — they should make for easy contact between the railway management on the the one hand and the customers as well as the Public Authorities on the other. »

Then the Section examined *Chapter III : General recommendations.*

Summary No. 9 (new No. 6) :

III. — General recommendations.

9. So far as the geographical and functional organization of a system is concerned, a Railway Administration must make its choice between the different solutions according to its own judgment of the relative disadvantages and advantages of these solutions when applied to its own particular case.

A discussion took place in which participated Messrs. Valdivieso, Bosc, Lemass, and Reymao Nogueira *(Portuguese Railways);* Mr. Dugas pointed out that the object of this Summary is to incite the Railway Administrations to study the solutions of organisation given in the preliminary reports and to make a choice amongst these solutions of the arrangements which may be advantageously applied to their system.

— The Summary was adopted unchanged.

Summary No. 10 (new No. 7) :

10. It is recommended that the following general principles be applied in respect of a system's organization :

a) The number of supervisory bodies should be as small as possible;

b) At each level of the organization, the different activities to be carried out must be clearly defined and allocated with full regard to the importance of essential activities;

c) Effective co-ordination must exist at every level of the organization;

d) Effective control of one level of the organization by the other must be set up;

e) The number of subordinates responsible to a single superior must be limited to the maximum number which is compatible with proper control;

f) Responsibility and authority must be defined at every level of the organization in such a way that the one always corresponds to the other.

Messrs. LEMON, BADHWAR *(Railway Board, India)*, MCLEOD, *(British Railways)*, REYMAO NOGUEIRA and DUGAS raised various points regarding the organisation of the Staff Department (recruitment, discipline, relations with the Trade Unions, etc.).

— The proposed text was adopted without alteration, as new *No. 7*.

To meet the request of several Delegates, Mr. DUGAS, who also shared their point of view, suggested that this subject should be the object of a report for a future Congress.

Summary No. 11 (new No. 8) :

11. A system's organization must either be under continual examination or must be examined at sufficiently close intervals for it to profit from every simplification which may increase administrative efficiency without increasing general expenses and which may reduce the administrative staff establishment without impeding either the smooth operation or the improvement of the system. To this end, it is appropriate to consider such steps as :

a) Centralization of certain work;

b) Amalgamation or regrouping of activities;

c) Revision of the geographical sections into which the area is divided and the corresponding abolition of some divisions;

d) Abolition of intermediate supervisory bodies;

e) The installation or abolition of sections entrusted with special duties;

f) Decentralization of powers and of authority;

g) Improvement of administrative methods of work, with special reference, in this connection, to modern techniques and particularly to mechanization;

h) The abolition of unproductive administrative work.

Mr. LALONI *(Italian State Railways)* suggested the alteration of the order in which the various measures appeared in the Summary.

Mr. MCLEOD wanted to make an alteration to clause *d*) in the English text.

Several delegates, and in particular Messrs. PLUMRIDGE *(Nigerian Railways)* and MANITTO TORRES, suggested that additional clauses should be added to the Summary; the former regarding the relations which should be maintained beween the different departments; the latter drew attention to the repercussions which the alterations and the re-organisation could have on the staff. Mr. DUGAS proposed a rearrangement of the clauses, which was adopted as indicated hereunder:

« 8. A system's organisation must either be under continual examination or must be examined at sufficiently close intervals for it to profit from every simplification which may increase administrative efficiency without increasing general expenses and which may reduce the administrative staff establishment without impeding either the smooth operation or the improvement of the system. To this end, it is appropriate to consider such steps as :

« 1. Amalgamation or regrouping of activities;

« 2. Abolition of intermediate levels of authority;

« 3. The installation or abolition of sections entrusted with special duties;

« 4. Decentralisation of powers and of authority;

« 5. Improvement of administrative methods of work, with special reference, in this connection, to modern techniques and particularly to mechanisation;

« 6) Revision of the geographical sections into which the area is divided and the corresponding abolition of some divisions;

« 7) Centralisation of certain work;

« 8) The abolition of unproductive administrative work. »

Mr. REYMAO NOGUEIRA, on behalf of the meeting, thanked Mr. DUGAS, *Special Reporter*, and Mr. ADAMSON, *Reporter*, for the very useful work they had done. *(Applause.)*

Mr. BOGAVAC *(Yugoslav Railways)* wanted to give details about the reorganisation of the Yugoslav Railways.

Since there was little time available, the PRESIDENT proposed that his report should appear in full in the Congress bulletin.

— The complete text of the Summaries adopted is as follows :

SUMMARIES.

I. — Functional organisation.

« 1. The principles and particularities « of functional organisation on different « systems vary considerably as between « the different Railway Administrations.

« It does not seem to be possible to « make an *a priori* decision, based on « broad generally recognised principles of « organisation, that one fully elaborated « type of organisation for the whole of « a particular system whatever system « may be, is to be preferred to all others. « Only by detailed analysis of the applic- « ation of these principles in each parti- « cular case can an opinion be given on « the general solution which seems to be « most suitable.

« It also seems impossible to deduce, « by means of a methodical analysis of « the various forms of organisation « adopted by the various systems, that « one form of organisation is always and « incontestibly preferable to every other « form.

« Every form of organisation which has « in fact been adopted by a Railway « Administration has advantages and « disadvantages. The fact that a form « of organisation proves satisfactory to « a particular Administration cannot be « taken to imply that it can be recom- « mended to another Administration; the « advantages and disadvantages must be « weighed in each particular case.

« Because it is impossible to refer cases « to a single standard type or organisation « or even to a limited number of standard « types of organisation, a critical examin- « ation of a system's organisation can « only usefully be conducted by consider- « ing separately each group of activities « for which there is only a small number « of possible solutions in existence.

« The observations set out above on « the subject of the over-all organisation « of a system, apply equally well to « detailed organisation.

« 2. It is useful to distinguish in a « Railway Administration between four « general functions. These are :

« the higher control of the under- « taking, which belongs to the « own- « ership » level;

« the determining of general policy « and of the overall programme, which « belongs to the « administrative » « level;

« the management of the system and « the working out of the programme « of execution, within the framework « of the general instructions received » from the previous level, which belongs « to the « management » level;

« the actual carrying out of that « programme, which belongs to the « « executive » level.

« Certain of the higher levels can be « amalgamated into one.

« Whatever may be the allocation of « duties between the different functions, « it is desirable that these functions should « be clearly defined and specifically alloc- « ated.

« 3. The decisions on the organisation « of a system which, it appears, have to « be considered the most carefully, are « concerned with the following questions : « at « administrative » level :

« The determination of the powers to « be delegated to the General Manager « (or to the Managing Committee);

« at « management level » :

« Wether to integrate the Headquarters « Departments within the General Mana- « gement or to make them into an addi- « tional supervisory body;

« The grouping of activities at head- « quarters level, the number of chief « officers to report to the General Mana- « ger (or Managing Committee) and, « when occasion arises, the co-ordination « of Departments by the Assistant General « Managers and the separation of the « essential activities on the one hand the « sections concerned with special central- « ised work on the other;

« at the « executive » level :

« The number of intermediate super- « visory bodies between headquarters and « the local units;

« The choice between a « departmen- « tal » form of organisation and a « « divisional » form of organisation;

« The fixing of the respective duties of « the chief officers at headquarters and « the chief regional officers;

« The grouping of activities at each « « executive » level;

«The delegation of powers to be made « in respect of the different levels of the « organisation.

II. — Geographical organisation.

« 4. The particular forms of geogra- « phical organisation of railway systems « vary to a considerable extent between « the different Railway Administrations.

« 5. The boundaries of every geogra- « phical area and the place chosen for its « headquarters should meet the following « requirements, as far as possible :

« — they should allow for effective « control throughout the area in question;

« — they should reduce to a minimum « the difficulties of liaison with neigh- « bouring areas;

« — they should allow for easy contact « between the area headquarters and the « headquarters immediately superior to « it in the organisation;

« — they should make for easy contact « between the railway management on « the one hand and the customers as well « as the Public Authorities on the other.

III. — General recommendations

« 6. So far as the geographical and « functional organisation of a system is « concerned, a Railway Administration « must make its choice between the diffe- « rent solutions according to its own « judgment of the relative disadvantages « and advantages of these solutions when « applied to its own particular case.

« 7. It is recommended that the follow- « ing general principles be applied in « respect of a system's organisation :

« *(a)* The number of regional levels « should be as small as possible;

« *(b)* At each level of the organisation, « the different activities to be carried out « must be clearly defined and allocated « with full regard to the importance of « essential activities;

« *(c)* Effective co-ordination must exist « at every level of the organisation;

« *(d)* Effective control of one level of « the organisation by the other must be « set up;

« *(e)* The number of subordinates « responsible to a single superior must « be limited to the maximum number « which is compatible with proper control;

« *(f)* Responsibility and authority « must be defined at every level of the « organisation in such a way that the one « always corresponds to the other.

« 8. A system's organisation must either « be under continual examination or « must be examined at sufficiently close « intervals for it to profit from every « simplification which may increase ad- « ministrative efficiency without increas- « ing general expenses and which may « reduce the administrative staff establish- « ment without impeding either the « smooth operation or the improvement « of the system. To this end, it is appro- « priate to consider such steps as :

« (1) Amalgamation or regrouping of « activities;

« (2) Abolition of intermediate levels « of authority;

« (3) The installation or abolition of « sections entrusted with special duties;

« (4) Decentralisation of powers and « of authority;

« (5) Improvement of administrative « methods of work, with special reference, « in this connection, to modern techni- « ques and particularly to mechanisation;

« (6) Revision of the geographical sec- « tions into which the area is divided and « the corresponding abolition of some « divisions;

« (7) Centralisation of certain work;

« (8) The abolition of unproductive « administrative work. »

— The Plenary Meeting ratified these Summaries on May 25, 1954.

QUESTION 9.

Railway participation in road transport undertakings.

Preliminary documents.

Report (America (North and South), Australia (Commonwealth of), Burma, Ceylon, Denmark, Egypt, Finland, India, Indonesia, Irak, Iran, Republic of Ireland, Netherlands, New Zealand, Norway, Pakistan, South Africa, Sweden and the United Kingdom of Great Britain and Northern Ireland and the territories for whose international relations the United Kingdom is responsible), by

Dr. J. P. B. TISSOT VAN PATOT. (See *Bulletin* for January 1954, p. 1, or separate issue No 16).

Report (Austria, Belgium and Colony, Bulgaria, Czechoslovakia, France and French Union, Western Germany, Greece, Hungary, Italy, Luxemburg, Poland, Portugal and Colonies, Rumania, Spain, Switzerland, Syria, Turkey and Yugoslavia), by Dr. G. DREYER. (See *Bulletin* for February 1954, p. 239, or separate issue No. 20.

Special Report by Dr. G. DREYER. (See *Bulletin* for May 1954, p. 573.)

Report of Section IV.

(See the *Congress Daily Journal* No. 4, p. 10; No. 5, p. 7; No. 6, pp. 2/*4*)

Meeting held on the 24th May, 1954.

Towards the end of the Session, after the examination of Question 8, the Section started the study of Question 9.

The PRESIDENT called on Mr. DREYER, *Special Reporter*, to give a Summary of the main points mentioned in his report. Mr. DREYER gave a brief résumé regarding the economic, legal and political aspects of the problem.

He concluded by stressing the necessity for a co-ordination of transport under the auspices of the Government Authorities, not only in the interest of the users, but also in the interest of the railway and road transport operators.

The Summaries were to be examined at the next meeting.

— The meeting adjourned at 11.55 a.m.

Meeting held on the 25th May, 1954.

The meeting opened at 9.5. a.m.

A general exchange of views then took place on the examination of *Summary No. 1*, worded as hereafter :

1. Transport technique is in a constant state of evolution. For some years, and more especially since the end of the war, it has undergone deep-reaching changes.

Mr. MAROIS *(French National Railways)* empharised the necessity there was for the railways to adapt their working methods like any other industry. Moreover, he stressed the difficulties with which the railways were faced in this connection :

a) the uneasiness on the part of the Public Authorities that the railways might « squeeze out » road transport, and that the deficit shown by the railways might be extended to road transport.

b) difficulties of an internal nature, owing to lack of enthusiasm on the part of the administrations who feared that this might result in competition within the undertaking.

Mr. SANTONI RUGIU *(Italian State Railways)* although in principle in agreement with Mr. MAROIS, thought that too strong a line taken in this matter might provoke unfavourable reaction on the part of the road transport operators.

Mr. DREYER, *Special Reporter*, pointed out that the points raised were already contained in the conclusions.

Mr. LALONI *(Italian State Railways)* suggested that only the technical aspects of the question should be discussed.

Mr. WANSINK *(Netherlands Railways)* stated that railways were in process of developing into general transport under-

takings and that it was therefore necessary for them to be allowed to adapt their working methods to meet these changes.

Mr. Crem *(Belgian National Railways)* suggested that the Summaries should be examined; the points raised up to the present in the general discussion were already included in the Summaries.

The President agreed to this suggestion, but proposed that the order of *Summaries Nos. 2 and 3* be changed as the latter was more directly connected with *Summary No. 1.*

Messrs. Laloni and Marois concurred in the President's proposal.

— *Summary No. 1* was adopted without alteration.

Summary No. 2 (formerly Summary No. 3) :

3. The railway should be treated like any other undertaking or industry by allowing it to make a wide use of the road technique. The railway cannot be required to seek after every possible way of reducing its costs and, consequently, to limit its adaptability both to modern techniques and the needs of its clients.

Alterations to the text were proposed by several speakers and in particular, Messrs. Wansink, Marois, Blee *(British Transport Commission)*, Sjöberg *(Swedish State Railways)*, Stewart *(Coras Iompair Eireann, Ireland)*, Dreyer and Lemass. *(Coras Iompair Eireann, Ireland)* The alteration suggested by Mr. Marois to replace the word « consequently » by « at the same time », and the one made by Mr. Lemass, to have « to limit » preceded by « to be obliged » were adopted.

The following text was adopted :

« 2. The railway should be treated like any other undertaking or industry by allowing it to make a wide use of the road technique. The railway cannot be required to seek after every possible way of reducing its costs and, at the same time, to be obliged to limit its adaptability both to modern techniques and the needs of its clients. »

Summary No. 3 (formerly Summary No. 2) :

2. It is agreed that the use of the motor technique enables the railway :

a) to rationalise its working, and consequently reduce its costs;

b) to improve the quality of its services by offering its clients a wider and more complete range of facilities, thereby maintaining and even increasing its traffic.

The text of this Summary did not give rise to any discussion with the exception of a suggestion made by Mr. Blee regarding the deletion of the word « even » in the last line of paragraph *b*), as the railways were progressive undertakings.

— *Summary No. 3 (formerly No. 2)* was adopted with this alteration.

Summary No. 4 :

4. The railway may have to resort to the road technique :

a) in the case of passenger traffic :

— on routes parallel to the railway (substituting bus services for railway services, replacing trains by motor services);

— on non-parallel routes (cross country lines, supplementary or feeder services);

— to run tourist tours combining rail and motor travel or even tours making use of motor services throughout;

b) in the case of freight traffic, for the most diverse purposes, in particular :

— delivery services;

— the transport of parcels traffic from the centre-stations;

— the transport of wagon-conveying trailers and rail-road trailers;

— the transport of containers;

— special transports;

— the transport of full loads when the railway services are replaced by lorry services or even the transport from one end of the journey to the other, if such is considered to be the most profitable.

Messrs. WANSINK, LEMASS, BLEE, MOULART *(Belgian National Railways)*, PROT *(French Government)* and DREYER took part in the discussion, during which consideration was given to whether or not it was opportune to give more details about the services where the railway might have to resort to road technique.

Mr. BLEE stressed the importance of the question of tariffs and working costs of the two different methods of transport, and added that these should be taken into consideration when examining the problem.

Mr. DREYER, *Special Reporter*, suggested that an additional clause should be added to the text of the paragraph *a*).

The PRESIDENT put to the vote the text with the alteration as proposed by Mr. DREYER. The following text was approved :

« *a*) in the case of passenger traffic :

« on routes parallel to the railway (substituting bus services for railway services, replacing trains by motor services, taking over existing bus services which run parallel to rail or the commercial control thereof); »

The meeting was adjourned at 11.0 a.m.

Meeting held on the 26th May, 1954.

The meeting was opened at 9.40 a.m. at the Headquarters of the British Transport Commission.

The meeting went on with the examination of *Summary No. 4*.

Mr. UPMARK *(Swedish State Railways and Vice-President)* suggested that another paragraph dealing with lines and regions where there was little traffic, be added to the existing text.

Messrs. DREYER, SJÖBERG, BLEE and NOLET DE BRAUWERE *(Belgian National Railways)* took part in the discussion.

Messrs. UPMARK and BLEE agreed to draft the text of the new paragraph.

The following text was adopted for *Summary No. 4* :

« 4. The railway may have to resort to the road technique :

« *a*) in the case of passenger traffic :

« — on routes parallel to the railway (substituting bus services for railway services, replacing trains by motor services, taking over existing bus services which run parallel to rail or the commercial control thereof).

« — on non-parallel routes (cross country lines, supplementary or feeder services);

« — to run tourist tours combining rail

and motor travel or even tours making use of motor services throughout;

« *b*) in the case of freight traffic, for the most diverse purposes, in particular :

« — collection and delivery services;

« — the transport of parcels traffic to and from the centre stations;

« — the transport of wagon-carrying trailers and rail-road trailers;

« — the transport of containers;

« — the transport of full loads when the railway services are replaced by lorry services or even the transport from one end of the journey to the other, if such is considered to be the most profitable. »

« *c*) In sparsely populated areas where both rail and road passenger services are provided, the real needs of transport should be studied with the object of reducing costs by avoiding wasteful duplication; serving the community by the more economical and flexible means whichever it may be. The same conclusion applied equally well with freight but here the criterion may well prove to be the nature and the quantity of the traffic rather than the density of population. »

Summary No. 5 :

5. The railway should be left to decide in what cases it is advantageous for it to make use of motor or lorry services for its traffic.

Some alterations to the text of *Summary No.* 5 were suggested.

Messrs. Upmark, Marois and Wansink took part in the discussion.

The alterations were intended to emphasise the principles put forward by the Special Reporter.

The following text was adopted :

« 5. The railway as a public transport undertaking ought to consider the use of road services, separate or combined with railway services, considering their relative merits as regards total cost of transport and to quality of service to the customers.

The railways should be left to decide in what cases these considerations should lead to the use of motor services. »

Summary No. 6 :

6. When the railway considers it « necessary or desirable » to make use of the road technique, different methods of operation may be used :

a) it can operate the road services under separate statutory organisation (en régie);

b) it can have them operated by private firms with which it has made a contract (charter contracts, renting of vehicles or services, partnership agreements, etc.) :

c) or it can have them operated by undertakings under its control (majority share) which as a result are associated undertakings of the railway, or merely undertakings in which it has a financial interest (minority share).

Messrs. Nolet de Brauwere, Sjöberg, Dreyer and Marois took part in the discussion and suggested slight alterations in the text and that the second paragraph of *Summary No. 7* be added to *Summary No. 6*. The following text was adopted :

« 6. When the railway considers it « necessary or desirable » to make use of the road technique, different methods of operation should be used :

« *a*) operate the road services directly or under separate statutory organisation (en régie);

« *b*) have them operated by private

firms with which it has made a contract (charter contracts, renting of vehicles or services, partnership agreements, etc.);

« *c*) or have them operated by undertakings under its control (majority share) which as a result are associated undertakings of the railway, or merely undertakings in which it has a financial interest (minority share).

« The choice of method should depend solely upon the economic factors involved. »

Summary No. 7 :

7. It is desirable in principle to make use of the method which will give the railway commercial control of the services, and at the same time guarantee its contacts with its clients.

The choice of method should depend solely upon the economic factors involved.

An exchange of views took place between Messrs. MAROIS and DREYER.

— The text of *Summary No. 7* was adopted but the last paragraph of this Summary was included in *Summary No. 6.*

Summary No. 8 :

8. The operating of passenger road services or freight services by affiliated companies (majority share) ensures great flexibility, and is justified by the considerable differences which exist between the two techniques (working conditions, social conditions, etc.) and the actual commercial atmosphere in which road transport has its being. With a statute similar to that granted to any other road transport undertaking it is possible to make a clear distinction as regards responsibility and adapt the services perfectly to the needs of the users whilst assuring that control of the transport remains in the hands of the railway. In addition, the subsidiary company whilst operating its own services, can also make use of the indirect method of working by contract.

The system of subsidiary companies, allowing these to have a large measure of self-government, is also that which enables the railway to reap the greatest advantages from the economic and financial points of view, whilst at the same time giving it a better chance to hold its own against actual or potential competition, to make sure of its proper place in the present or future transport market, and to safeguard its own traffic and at the same time acquire further outlets.

The system of associated companies is also that which fits in the best with the idea of regional decentralisation.

— This Summary was adopted without alteration.

Summary No. 9 :

9. The participation of the railway in road transport undertakings by one of the methods which assure that it retains effective control whilst the autonomy of the road undertaking is safeguarded, fully realises the idea of organic coordination of overland transport. It should be fitted into the framework of a consistent and logical general policy for the traffic.

This Summary did not give rise to any lengthy discussion. Slight alterations to the wording of the text were proposed and the following text was adopted :

« 9. The participation of the railway in road transport undertakings by one of the methods which assure that it retains effective control whilst the operating autonomy of the road undertaking is safeguarded, contributes to the idea of organic co-ordination of overland transport. It should be fitted into the framework of a consistent and logical general policy for the transport. »

Summary No. 10 :

10. In favouring the extension of railway road services by the setting up of associated road firms of a certain size, we also begin

to get progressive rationalisation of professional road transport, a rationalisation which, thanks to the coordination of the activities of these subsidiary companies (communal buying, use of stock, repairs, etc.) leads to a reduction in their own costs.

A discussion took place on the desirability of maintaining this Summary which, according to Mr. MAROIS, was too formal.

Mr. WANSINK concurred in the views expressed by Mr. MAROIS.

The Special Reporter justified keeping this Summary in view of the experience of certain undertakings. He was not, however, opposed to the deletion of this Summary if this were the wish of the meeting.

— The meeting decided that *Summary No. 10 should be deleted.*

Summary No. 11 (which becomes No. 10) :

11. Consequently the railway should be given every freedom to follow methodically the extension of its road services and to have recourse to that method of operation best suited to its needs; in particular the setting up of associated companies, either by taking shares in existing firms or by buying them up, or by setting up new firms.

There was no discussion on this particular Summary. However, it was decided to delete the word « consequently » in the first sentence.

The Summary was adopted with this slight alteration.

Summary No. 12 (which becomes No. 11) :

12. Where such exist, legal or administrative obstacles which hinder such freedom should be done away with or at least diminished, and where there are no such obstacles, it is recommended to the railway managements to make free use of the faculties they have, both for the present and the future, in the interest of a more rational and effective operation.

Mr. DREYER, *Special Reporter*, read out a new text proposed by Mr. MAROIS.

Mr. MANITTO TORRES *(Benguela Railways)* also proposed a text appreciably different in both wording and aspect.

Mr. WANSINK was of the opinion that the text proposed by Mr. MANITTO TORRES raised a question of policy in connection with transport as a whole. He suggested that this matter be discussed at a future Congress.

Messrs. MAROIS and DREYER, *(Special Reporter)*, agreed to this suggestion, which was approved by Mr. MANITTO TORRES. However, the text proposed by Mr. MANITTO TORRES would be published in the bulletin.

The following text was adopted :

« 11. Where such exist, legal or administrative obstacles which hinder such freedom should be done away with or at least diminished. These obstacles cannot be justified by the fear that the railways will hinder the normal development of road transport, the railways demanding no monopoly and the experience of certain Shipping Companies resorting to air, has proved that there was no foundation for this fear.

« It can neither be justified by the possibility in certain countries, of increased financial burden to the State, as the railway can, as a result of the autonomy

and regulations governing their road transport undertakings, give the required guarantees of the sound financial footing of these undertakings.

« Where there are no such obstacles, it is recommended to the railway managements to make free use of the facilities they have, both for the present and the future, in the interest of a more rational and effective operation. »

Summary No. 13 (which becomes No. 12) :

13. It is to be recommended that the administrations, in so far as they have not already done so, to :

a) set up, together with their central services, a coordination department or single road transport department, the duty of which will be to study systematically :

— the advantages and bases on which the road technique should be used;
— the possibilities of participation in self-contained road transport undertakings (operation by subsidiary companies);

— if there are no such possibilities, other methods of road operation (operation under separate statutory organisation (en régie), contracts, chartering or renting vehicles or services, etc.);

— the control of such participations or other methods of road operation.

These functions can, if need be, be delegated to an affiliated company.

b) set up, by the Railway Administration, a separate balance sheet for its investments in road services as well as the operating results of such services or the receipts from its participation in self-contained affiliated companies.

Messrs. DREYER, *Special Reporter*, MAROIS, BLEE and WANSINK took part in the discussion.

It was agreed to have an additional paragraph inserted before the former paragraph *a*).

— The following text was adopted :

« 12. It is to be recommended that the administrations, in so far as they have not already done so :

« *a*) adopt a more resolute road transport policy in all spheres where the satisfying of the needs of the users and the operational costs justify this solution;

« *b*) set up together with their central services a road transport service as well as a co-ordination department, the duties of which will be to study systematically :

« — the advantages and bases on which the road technique should be used;

« — the possibilities of participation in self-contained road transport undertakings (operation by subsidiary companies);

« — if there are no such possibilities, other methods of road operation (operation under separate statutory organisation *(en régie)*, contracts, chartering or renting vehicles or services, etc.) ;

« — the control of such participations or other methods of road operation.

« These functions can, if need be, be delegated to an affiliated company.

« *c*) set up, by the Railway Administration, a separate balance sheet for its investments in road services as well as the operating results of such services or the receipts from its participation in self-contained affiliated companies.

« *d*) conclude among themselves the necessary agreements with a view to co-ordinating the operation of their international road services. »

The agenda being exhausted, the PRESIDENT thanked the delegates present at the meeting for the contribution they

had made to the study of the various problems examined, and particularly Mr. Dreyer, *Special Reporter*, as well as the secretariat of the section.

Mr. Wansink, on behalf of the meeting, thanked and congratulated the President on the way in which he had conducted the discussion. *(Applause.)*

— The meeting closed at 11.45 a.m.

— The complete text of the *Summaries* is as follows :

SUMMARIES.

« 1. Transport technique is in a con- « stant state of evolution. For some « years, and more especially since the « end of the war, it has undergone deep- « reaching changes.

« 2. The railway should be treated like « any other undertaking or industry by « allowing it to make a wide use of the « road technique. The railway cannot be « required to seek after every possible « way of reducing its costs and, at the « same time, to be obliged to limit its « adaptability both to modern techniques « and the needs of its clients.

« 3. It is agreed that the use of the « motor technique enables the railway :

« *(a)* to rationalise its working and « consequently reduce its costs;

« *(b)* to improve the quality of its « services by offering its clients a wider « and more complete range of facilities, « thereby maintaining and increasing its « traffic.

« 4. The railway may have to resort to « the road technique :

« *(a)* in the case of passenger traffic :

« — on routes parallel to the railway « (substituting bus services for railway « services, replacing trains by motor « services, taking over existing bus ser- « vices which run parallel to rail or the « commercial control thereof).

« — on non-parallel routes (cross coun- « try lines, supplementary or feeder ser- « vices);

« — to run tourist tours combining « rail and motor travel or even tours « making use of motor services through- « out;

« *(b)* in the case of freight traffic, for « the most diverse purposes, in particular :

« — collection and delivery services;

« — the transport of parcels traffic to « and from the centre stations;

« — the transport of wagon-conveying « trailers and rail-road trailers;

« — the transport of containers;

« — special transports including abnor- « mal indivisible loads;

« — the transport of full loads when « the railway services are replaced by « lorry services or even the transport « from one end of the journey to the « other, if such is considered to be the « most profitable.

« *(c)* In sparsely populated areas where « both rail and road passenger services « are provided the real needs of transport « should be studied with the object of « reducing costs by avoiding wasteful « duplication; serving the community « by the more economical and flexible « means whichever it may be. The same « conclusion applies equally well with « freight but here the criterion may well

« prove to be the nature and the quan-
« tity of the traffic rather than the density
« of population.

« 5. The railway, as a public transport
« undertaking, must consider the use
« of road services, separate or combined
« with railway services, considering their
« relative merits as regards total costs of
« transport and quality of service to the
« customers. The railways must be left
« to decide in what cases these consider-
« ations should lead to the use of motor
« services.

« 6. When the railway considers it
« « necessary or desirable » to make use
« of the road technique, different methods
« of operation should be used :

« *(a)* operate the road services directly
« or under separate statutory organisation
« (en régie);

« *(b)* have them operated by private
« firms with which it has made a contract
« (charter contracts, renting of vehicles
« or services, partnership agreements,
« etc.);

« *(c)* or have them operated by under-
« takings under its control (majority
« share) which as a result are associated
« undertakings of the railway, or merely
« undertakings in which it has a financial
« interest (minority share).

« The choice of method should depend
« solely upon the economic factors involv-
« ed.

« 7. It is desirable in principle to make
« use of the method which will give the
« railway commercial control of the ser-
« vices, and at the same time guarantee
« its contacts with its clients.

« 8. The operating of passenger road
« services or freight services by affiliated
« companies (majority share) ensures
« great flexibility, and is justified by the
« considerable differences which exist
« between the two techniques (working
« conditions, social conditions, etc.) and
« the actual commercial atmosphere in
« which road transport has its being.
« With a statute similar to that granted
« to any other road transport undertaking,
« it is possible to make a clear distinction
« as regards responsibility and adapt the
« services perfectly to the needs of the
« users whilst assuring that control of the
« transport remains in the hands of the
« railway. In addition, the subsidiary
« company whilst operating its own ser-
« vices, can also make use of the indirect
« method of working by contract.

« The system of subsidiary companies,
« allowing these to have a large measure
« of self-government, is also that which
« enables the railway to reap the greatest
« advantages from the economic and
« financial points of view, whilst at the
« same time giving it a better chance to
« hold its own against actual or potential
« competition, to make sure of its proper
« place in the present or future transport
« market, and to safeguard its own traffic
« and at the same time acquire further
« outlets.

« The system of associated companies
« is also that which fits in the best with
« the idea of regional decentralisation.

« 9. The participation of the railway
« in road transport undertakings by one
« of the methods which assure that it
« retains effective control whilst the opera-
« ting autonomy of the road undertaking

« is safeguarded, contributes to the idea « of organic coordination of overland « transport. It should be fitted into the « framework of a consistent and logical « general policy for the transport.

« 10. The railway should be given every « freedom to follow methodically the « extension of its road services and to « have recourse to that method of opera- « tion best suited to its needs; in particular « the setting up of associated companies, « either by taking shares in existing firms « or by buying them up, or by setting up « new firms.

« 11. Where such exist, legal or admi- « nistrative obstacles which hinder such « freedom should be done away with or « at least diminished.. These obstacles « cannot be justified by the fear that the « railways will hinder the normal develop- « ment of road transport, the railways « demanding no monopoly and the exper- « ience of certain Shipping Companies « resorting to air, has proved that there « was no foundation for this fear.

« It can neither be justified by the « possibility, in certain countries, of « increased financial burden to the State, « as the railway can, as a result of the « autonomy and regulations governing « their road transport undertakings, give « the required guarantees of the sound « financial footing of these undertakings.

« Where there are no such obstacles, it « is recommended to the railway mana- « gements to make free use of the facilities « they have, both for the present and the « future, in the interest of a more rational « and effective operation.

« 12. It is to be recommended that the « Administrations, in so far as they have « not already done so, to :

« *(a)* adopt a more resolute road « transport policy in all spheres where the « satisfying of the needs of the users and « the operational costs justify this solu- « tion;

« *(b)* set up together with their central « services a road transport service as « well as a co-ordination department, the « duties of which will be to study syste- « matically :

« — the advantages and bases on « which the road technique should be « used;

« — the possibilities of participation in « self-contained road transport under- « takings (operation by subsidiary com- « panies);

« — if there are no such possibilities, « other methods of road operation (oper- « ation under separate statutory organis- « ation [en régie], contracts, chartering or « renting vehicles or services, etc.);

« — the control of such participations « or other methods of road operation.

« These functions can, if need be, be « delegated to an affiliated company.

« *(c)* set up, by the Railway Administra- « tion, a separate balance sheet for its « investments in road services as well as « the operating results of such services « or the receipts from its participation in « self-contained affiliated companies.

« *(d)* conclude among themselves the « necessary agreements with a view to « co-ordinating the operation of their « international road services. »

— These Summaries were ratified by the Plenary Meeting on the 26th May 1954.

SECTION V. — Light Railways and Colonial Railways.

President : W. A. VRIELYNCK.

Vice-Presidents : T. C. COURTNEY, A. BARBAUT.

Principal Secretary : N. CHARLIER.

QUESTION 10.

Wear of rails on curves:

(a) characteristics of track-laying on curve and details of the rolling stock liable to cause premature wear of the rails;

(b) running effects of locomotives and motor coaches with motor bogies;

(c) results of the investigations made and proposed remedies. Use of rail-lubrication processes.

Preliminary documents.

Report (America (North and South), Australia (Commonwealth of), Burma, Ceylon, Denmark, Egypt, Finland, India, Indonesia, Irak, Iran, Republic of Ireland, New Zealand, Norway, Pakistan, South Africa, Sweden and the United Kingdom of Great Britain and Northern Ireland and the territories for whose international relations the United Kingdom is responsible), by V. VENKATA-RAMAYYA. (See *Bulletin* for September 1953, p. 533, or separate issue No. 3)

Report (Austria, Belgium and Colony, Bulgaria, Czechoslovakia, France and French Union, Germany, Greece, Hungary, Italy, Luxemburg, Netherlands, Poland, Portugal and Colonies, Rumania, Spain, Switzerland, Syria, Turkey and Yugoslavia), by L. RIPERT. (See *Bulletin* for October 1953, p. 737, or separate issue No. 7.)

Special Reporter : L. RIPERT. (See *Bulletin* for May 1954, p. 583.).

Report of Section V.

(See the *Congress Daily Journal*, No. 2, p. 10; No. 3, p. 8; and No. 5, p. 9.)

Meeting held on the 20th May, 1954.

The PRESIDENT called upon Mr. RIPERT, *Special Reporter.*

Mr. RIPERT read in succession the Summaries of his special report.

Summary No. 1 :

1. The characteristic form of wear on a rail of the outer line of curved track is a chamfering of the inner face of the head, the angle of which varies between about 20° to 30° to the centre of the rail. In addition, the running surface is worn on a plane sometimes slightly inclined towards the centre of the track.

The inner line of rail is subject to vertical wear of the running surface, on a plane almost parallel to it.

The finish of surface is usually maintained. Binding is sometimes experienced, accompanied by the shedding of flakes of metal.

After discussion about the inclination of the running surface of the outer rails in which Mr. VENKATARAMAYYA, *Reporter*, Mr. RIPERT and Mr. H. DULIEU *(Société Nationale des Chemins de fer vicinaux, Belgium)* took part, *Summary No. 1* was adopted.

Summary No. 2 :

2. The characteristics of track laying considered to have the greatest influence on wear of rails on curve are :

— curvature of the track; lateral wear

being particularly marked in curves with radii of less than 600 m (656 yards) standard gauge and 350 m (383 yards) metre gauge;

— insufficient superelevation with lateral wear of the outer rail; excessive superelevation for vertical wear of the inner rail;

— steep down gradients;

— excessive widening of the gauge;

— insufficiently long parabolic curves.

After an exchange of views between Mr. MEUNIER *(Chemin de fer Franco-Ethiopien de Djibouti à Addis-Abeba)*, Mr. RICHELOT *(Otraco, Belgium)*, Mr. VENKATARAMAYYA, Mr. BROCA, *(Secretary)* and Mr. RIPERT, *Summary No. 2* was adopted, after alteration of the 2nd paragraph as follows :

« curvature of the track; lateral wear being appreciable in curves with radii of less than 600 m (656 yards) standard gauge and 350 m (383 yards) metre gauge. »

Summary No. 3 :

3. The features of rolling stock which have a predominant influence on the wear of curved rails are principally those which affect the angle of thrust of the wheel on the rail; long rigid wheelbase, or on the contrary an insufficiently long wheelbase, total play of the axle in the track, longitudinal or lateral play of the axleboxes, lateral play of journals.

Amongst other causes of wear may be mentioned : the stiffness of some bogie or bissel side control arrangements, amount of unsprung masses, diameter of wheels. Small diameter wheels cause higher stresses and heavier hammer-blows at rail gaps than wheels of large diameter.

— *Summary No. 3* was agreed without discussion.

Summary No. 4 :

4. The effects of locomotives and motor coaches with driving bogies are the object of varying views. Whilst some Administrations have not noticed any harmful results, others consider them to be particularly aggressive and to produce lateral rail wear which is much heavier than that caused by carrying bogies or by certain long wheelbase vehicles.

These effects are attributed principally :

— to the amount of the axle load and especially to the unsprung mass (particularly of nose-suspended traction motors);

— to the increased rate of acceleration and speed;

— to asymmetrical motor couple.

They show themselves particularly in track irregularities.

Summary No. 4 was adopted. Mr. MEUNIER mentioned that the lateral wear of rails is reduced when the lateral play of the carrying axle in three-axle bogies is suppressed.

Summary No. 5 :

5. As the factors which influence the wear of rails in curves are numerous, it is difficult to separate any one of them from the whole. The quality of maintenance must also be taken into account.

It is generally admitted that the reduction in rail section, in a curve of radius R, increases as a function of :

— the curvature, in a proportion between $\frac{K}{R}$ and $\frac{K}{R^2}$;

— the axle load and the speed of operation;

— the angle of thrust of the guiding axle.

After an exchange of views between Messrs. VENKATARAMAYYA, MEUNIER and RICHELOT, the text of this Summary was modified as follows :

« 5. As the factors which influence the wear of rails in curves are numerous, it is difficult to separate any one of them from the whole. The quality of maintenance must also be taken into account.

« It is generally admitted that the lateral wear of the outer rail in a curve of radius R increases as a function of :

« the curvature, in a proportion between $\frac{K}{R}$ and $\frac{K}{R^2}$;

« the axle load and the speed of operation;

« the angle of thrust of the axles. »

Summary No. 6 :

6. The limits of lateral wear and that on the running surface have been established on the basis of experience, taking into account the reduced strength of the rail.

It is only in exceptional cases that chamfering of the worn head of the outer rail has been admitted as a decisive factor in derailments caused by the flange mounting the rail.

— This Summary was adopted without discussion.

Summary No. 7 :

7. To combat wear of rails in curves, the following methods are adopted :

— reduction in widening of the gauge, and modification of the superelevation;

— laying of a check rail along the inner line;

— use of rails with a high resistance to wear;

— lubrication of rails.

On several Railways, the life of rails is extended where one lateral face of the head is worn by reversing them end to end, by changing them over to the other line of rail, or by relaying them in tracks of less importance.

After an exchange of views in which Mr. PIALOUX *(Chemins de fer de l'Afrique Equatoriale Française et du Cameroun)* and Mr. VENKATARAMAYYA took part, *Summary No. 7* was modified as follows :

« 7. To combat wear of rails in curves, the following methods are adopted :

« alteration of widening of the gauge, and modification of the superelevation;

« use of rails with a high resistance to wear;

« lubrication of rails.

« On several Railways, the life of rails is extended where one lateral face of the head is worn by reversing them end to end, by changing them over to the other line of rail, or by relaying them in tracks of less importance. »

Summary No. 8 :

8. The degree of gauge-widening given to track has been reduced on some lines, with the aim of lowering the angle of thrust and reducing oscillation, as far as compatible with the free inscription of vehicles in the curve. Attempts have been made to achieve a closer relationship between superelevation and operating speeds.

— This Summary was adopted without discussion.

Summary No. 9 :

9. A check rail is sometimes laid along the inner line of certain particularly sharp curves, but this seems to be essentially a safety measure. The check rail has, in fact, the drawbacks of causing supplementary wear on the inner surface of types and increasing resistance to movement.

After an exchange of views between Messrs. MEUNIER, VENKATARAMAYYA and DEVOUGE *(Chemins de fer de l'Afrique Equatoriale Française et du Cameroun)*, this Summary was altered as indicated hereafter :

« 9. A check rail is sometimes laid along the inner rail of certain particularly sharp curves to increase safety. The check rail has, however, the drawbacks

of causing supplementary wear on the inner surface of tyres and increasing the resistance to movement. »

— The meeting was adjourned at 11 o'clock. The continuation of the discussion being left for the next meeting.

Meeting held on the 21st May, 1954.

M. RIPERT continued reading the Summaries.

Summary No. 10 :

10. Rails of steel with a high degree of resistance to wear are used by some Railways in low radius curves of lines with heavy traffic : naturally-hard rails of a single grade of steel usually manganese — composite steel rails in which only the portion of the head subject to wear is of hard steel — heat-treated rails (sorbitic or martensitic).

These rails give a greatly increased life, 2 to 5 times that of ordinary quality steel. Their higher price, however, often prevents their use being extended.

After a discussion in which Messrs. SCHADER *(Chemins de fer de l'Etat suédois)*, RICHELOT, DE BUSSCHERE *(Chemin de fer du Bas-Congo au Katanga)*, KLAREN *(Union Internationale des Chemins de fer)*, BROCA, MEUNIER, RENARD *(Railways Economiques de Liège-Seraing et extensions)*, and MOHR *(Chemin de fer Rhétique)* took part, *Summary No. 10* was adopted as follows :

« 10. Rails of steel with a high degree of resistance to wear are used by some Railways in low radius curves of lines with heavy traffic : naturally-hard rails of a single grade of steel usually manganese — composite steel rails in which only the portion of the head subject to wear is of hard steel — heat-treated rails (sorbitic or martensitic).

« These rails give a greatly increased life, 2 to 5 times that of ordinary quality steel.

« The higher price of rails with a high proportion of manganese and of bi-metallic rails, the brittleness of the former particularly in low temperatures, together with heat-treated rails, however, prevent their use being extended. »

Summary No. 11 :

11. Lubrication of the inner face of the head on the outer line of rail is at present used by numerous Railways.

Manual lubrication, limited to special cases because of the labour cost involved, must be carefully done to avoid the spread of oil on to the running surface.

Several types of fixed lubricators and equipment mounted on motive units or trailer vehicles provide a satisfactory regularity of operation.

The use of lubricators fixed to the rail at the entrance to curves, worked by the passage of each wheel, is particularly justified on isolated curves of low radius, or where the curves are relatively few in number.

Equipment fitted to motive units or trailer vehicles, either lubricating the rails directly or the wheel tyres, are more economical than the above on lines which include fairly numerous curves. This lubrication can be continuous on very sinuous lines, but is usually automatically restricted to the entrance to low radius curves.

Rail lubrication provides a very efficient means of reducing not only their lateral wear, but also tyre wear. The life of rails is, in certain cases, almost doubled.

Summary No. 11 was adopted after a discussion between Messrs. PIALOUX, MASSERON *(Compagnie Fermière des Chemins de fer Tunisieus)*, BROCA, VENKATARAMAYYA, RICHELOT and MEUNIER, as follows :

« 11. Lubrication of the inner face of the head on the outer line of rail is at present used by numerous Railways.

« Manual lubrication, limited to special cases because of the labour cost involved, must be carefully done to avoid the spread of oil on to the running surface.

« Several types of fixed lubricators and equipment mounted on motive units or trailer vehicles provide a satisfactory regularity of operation.

« The use of lubricators fixed to the rail at the entrance to curves, worked by the passage of each wheel, is particularly justified on isolated curves of low radius, or where the curves are relatively few in number.

« These lubricators having to clear the gauge of the electro-magnetic brakes, it follows that it would be useful to have this gauge defined.

« Equipment fitted to motive units or trailer vehicles, either lubricating the rails directly or the wheel tyres, are more economical than the above on lines which include fairly numerous curves. This lubrication can be continuous on very sinuous lines, but is usually automatically restricted to the entrance to low radius curves.

« Rail lubrication provides a very efficient means of reducing not only their lateral wear, but also tyre wear. The life of rails is, in certain cases, almost doubled. »

The PRESIDENT went over the Summaries of Question 10, and an interchange of views took place between Mr. KLAREN and Mr. RIPERT, *Special Reporter*, on the question of *Summary No. 5*. The text was modified as follows :

« 5. As the factors which influence the wear of rails in curves are numerous, it is difficult to separate any one of them from the whole. The quality of maintenance must also be taken into account.

« It is generally admitted that the lateral wear of the outer rail in a curve or radius R increases as a function of :

« — the curvature, in a proportion *which appears to be* between $\frac{K}{R}$ and $\frac{K}{R^2}$;

« — the axle load and the speed of operation;

« — the angle of thrust of the axles. »

Summary No. 7 was also modified after an exchange of views between Mr. MASSERON and Mr. MOHR. The following paragraph being added at the end :

« It appears that reversing the rails end to end is of least interest. »

A discussion took place during which several points of interest were raised by Messrs. HIRZEL *(Office Fédéral des Transports, Switzerland)*, BOSC *(Chemins de fer de Madagascar)*, SEGRETAIN *(Chemins de fer de Gafsa)*, and ROUSSET *(Chemins de fer Franco-Ethiopien de Djibouti à Addis-Abeba)* on the subject of gauge widening on curves.

The PRESIDENT then thanked the delegates who were present at the meetings of the Fifth Section and particularly those who took part in the discussions.

The meeting was adjourned at 11.0 a.m.

— The complete text of the Summaries adopted is the following :

SUMMARIES.

« 1. The characteristic form of wear on « a rail of the outer line of curved

« track is a chamfering of the inner « face of the head, the angle of which « varies between about 20° to 30° to the « centre of the rail. In addition, the « running surface is worn on a plane « sometimes slightly inclined towards the « centre of the track.

« The inner line of rail is subject to ver- « tical wear of the running surface, on a « plane almost parallel to it.

« The finish of surface is usually main- « tained. Binding is sometimes experienc- « ed, accompanied by the shedding of « flakes of metal.

« 2. The characteristics of track laying « considered to have the greatest influence « on wear of rails on curve are :

« curvature of the track; lateral wear « being appreciable in curves with radii « of less than 600 m. (656 yards) standard « gauge and 350 m. (383 yards) metre « gauge :

« — insufficient superelevation with lat- « eral wear of the outer rail; excessive « superelevation for vertical wear of the « inner rail;

« — steep down gradients;

« — excessive widening of the gauge;

« — insufficiently long parabolic curves.

« 3. The features of rolling stock which « have a predominant influence on the « wear of curved rails are principally « those which affect the angle of thrust of « the wheel on the rail; long rigid wheel- « base, or on the contrary an insufficiently « long wheelbase, total play of the axle « in the track, longitudinal or lateral play « of the axleboxes, lateral play of jour- « nals.

« Amongst other causes of wear may be « mentioned : the stiffness of some bogie « or bissel side control arrangements, « amount of unsprung masses, diameter « of wheels. Small diameter wheels cause « higher stresses and heavier hammer- « blows at rail gaps than wheels of large « diameter.

« 4. The effects of locomotives and « motor coaches with driving bogies are « the object of varying views. Whilst some « Administrations have not noticed any « harmful results, others consider them « to be particularly aggressive and to « produce lateral rail wear which is much « heavier than that caused by carrying « bogies or by certain long wheelbase « vehicles.

« These effects are attributed prin- « cipally :

« — to the amount of the axle load and « especially to the unsprung mass (parti- « cularly of nose-suspended traction mo- « tors);

« — to the increased rate of acceleration « and speed;

« — to asymmetrical motor couple.

« They show themselves particularly « in track irregularities.

« 5. As the factors which influence the « wear of rails in curves are numerous, « it is difficult to separate any one of them « from the whole. The quality of main- « tenance must also be taken into account.

« It is generally admitted that the lateral « wear of the outer rail in a curve of « radius R increases as a function of :

« the curvature, in a proportion which « appears to be between $\frac{K}{R}$ and $\frac{K}{R^2}$;

« the axle load and the speed of oper-
« ation;

« the angle of thrust of the axles.

« 6. The limits of lateral wear and that « on the running surface have been esta- « blished on the basis of experience, « taking into account the reduced strength « of the rail.

« It is only in exceptional cases that « chamfering of the worn head of the « outer rail has been admitted as a « decisive factor in derailments caused by « the flange mounting the rail.

« 7. To combat wear of rails in curves, « the following methods are adopted :

« — alteration of widening of the « gauge, and modification of the super- « elevation;

« — use of rails with a high resistance « to wear;

« — lubrication of rails.

« On several Railways, the life of rails « is extended where one lateral face of « the head is worn by reversing them end « to end, by changing them over to the « other line of rail, or by relaying them « in tracks of less importance.

« It appears that reversing the rails « end to end is of least interest.

« 8. The degree of gauge-widening given « to track has been reduced on some lines, « with the aim of lowering the angle of « thrust and reducing oscillation, as far « as compatible with the free inscription « of vehicles in the curve. Attempts have « been made to achieve a closer relation- « ship between superelevation and oper- « ating speeds,

« 9. A check rail is sometimes laid along « the inner rail of certain particularly « sharp curves to increase safety. The « check rail has, however, the drawbacks « of causing supplementary wear on the « inner surface of tyres and increasing « the resistance to movement.

« 10. Rails of steel with a high degree « of resistance to wear are used by some « Railways in low radius curves of lines « with heavy traffic : naturally-hard rails of « a single grade of steel usually manga- « nese — composite steel rails in which « only the portion of the head subject to « wear is of hard steel — heat-treated « rails (sorbitic or martensitic).

« These rails give a greatly increased « life, 2 to 5 times that of ordinary quality « steel.

« The higher price of rails with a high « proportion of manganese and of bi- « metallic rails, the brittleness of the « former particularly in low temperatures, « together with heat-treated rails, how- « ever, prevent their use being extended.

« 11. Lubrication of the inner face of « the head on the outer line of rail is at « present used by numerous Railways.

« Manual lubrication, limited to spe- « cial cases because of the labour cost « involved, must be carefully done to « avoid the spread of oil on to the run- « ning surface.

« Several types of fixed lubricators and « equipment mounted on motive units or « trailer vehicles provide a satisfactory « regularity of operation.

« The use of lubricators fixed to the « rail at the entrance to curves, worked « by the passage of each wheel, is particul- « arly justified on isolated curves of low

« radius, or where the curves are relat- « ively few in number.

« These lubrificators having to clear « the gauge of the electro-magnetic brakes, « it follows that it would be useful to « have this gauge defined.

« Equipment fitted to motive units or « trailer vehicles, either lubricating the « rails directly or the wheel tyres, are more « economical than the above on lines « which include fairly numerous curves. « This lubrication can be continuous on « very sinuous lines, but is usually autom- « atically restricted to the entrance to « low radius curves.

« Rail lubrication provides a very effi- « cient means of reducing not only their « lateral wear, but also tyre wear. The « life of rails is, in certain cases, almost « doubled. »

— The Plenary Meeting held on the 25th of May ratified these Summaries.

QUESTION 11.

Protection of overhead lines, substations, locomotives and motor coaches against accidents of electric nature (excess voltage, overloads, short circuits and lightning).

Preliminary documents.

Report (America (North and South), Australia (Commonwealth of), Burma, Ceylon, Denmark, Egypt, Finland, India, Indonesia, Irak, Iran, Republic of Ireland, New-Zealand, Norway, Pakistan, South Africa, Sweden and the United Kingdom of Great Britain and Northern Ireland and the territories for whose international relations the United Kingdom is responsible), by T. S. PICK, B. Sc. (Eng.), (See *Bulletin* for November 1953, p. 887, or separate issue No. 11.)

Report (Austria, Belgium and Colony, Bulgaria, Czechoslovakia, France and French Union, Germany, Greece, Hungary, Italy, Luxemburg, Netherlands, Poland, Portugal and Colonies, Rumania, Spain, Switzerland, Syria, Turkey and Yugoslavia), by J. F. M. DE BOECK. (See *Bulletin* for February 1954, p. 191, or separate issue No. 19.)

Special Reporter : J. F. M. De BOECK. (See *Bulletin* for May 1954, p. 594.)

Report of Section V.

(See the *Congress Daily Journal* : No. 4, pp. 10/12; No. 5; pp. 7/9 and No. 6, p. 4.)

Meeting held on the 24th May, 1954.

Mr. Vrielynck, *President*, opened the session at 9 a.m. He asked Mr. De Boeck, *Special Reporter*, to read the Summaries of the special report.

Protection of high-tension distribution systems.

Summary No. 1 :

1. The relay types of current manufacture assure an acceptable protection.

— Adopted without modification.

Summary No. 2 :

2. *a*) The protection of each point of distribution, including traction substations, is recommended.

b) In order to obtain an adequate protection of the installations, the protection should include overcurrent relays, combined with earth fault relays; in this respect, relays of the differential type are not sufficient.

— *Summary No. 2* was also adopted without alteration.

Protection of static transformers.

Summary No. 3 :

3. The ideal protection against overloads and short circuits consists of a group of two

devices which control the tripping of the primary circuit breaker :

a) by an instantaneous overcurrent element;

b) by a device which includes an element whose temperature would reproduce that of the hottest spot of the windings.

A discussion between Mr. WALTER *(French National Railways)* Mr. PICK, *Reporter*, and Mr. VRIELYNCK led to a modification of the text as follows :

« 3. The ideal protection against overloads and short circuits consists of a group of two devices which control the tripping of the primary circuit breaker :

« *a*) by an instantaneous overcurrent element;

« *b*) by a device which includes an element whose temperature would produce *that of the hottest spot of the windings.*

« The protection against overloads of converter units being such as to amply cover that of transformers, it is possible to dispense with protection of transformers themselves. »

Summary No. 4 :

4. Theoretically, it is the « thermal image » which assures the most adequate protection against excessive heating.

— Adopted.

Summary No. 5 :

5. Overcurrent time delay relays assure an acceptable protection for all practical purposes. Thermal relays of this type do not present any marked advantage.

— This Summary remained unchanged.

Summary No. 6 :

6. For oil immersed transformers, the use of contact thermometers measuring the oil temperature or thermostats gives a supplementary protection.

— Adopted as it is.

Summary No. 7 :

7. No H.T. surge arrestor offers a completely reliable protection. Their installation is not indispensable, especially when other devices ad hoc exist (earth wire on overhead distribution lines, shock coils on transformer windings).

— Adopted.

Summaries Nos. 8 and 9 were also adopted without alteration as follows :

8. There is a general tendency towards the use of the Buchholz relay as a protective device against internal damage to oil immersed transformers.

9. It is logical to install a protective device in the air stream of the air cooled transformers.

The Meeting then considered the Chapter :

Protection of static convertors.

Summary No. 10 :

10. For convertors with several vacuum enclosures, *complete* protection against overloads and short circuits (external and internal) is assured by the combination of :

a) overcurrent relays actuating the unit H.T. circuit breaker;

b) high-rupturing capacity anode fuses or high-speed overcurrent anode relays;

c) an individual overcurrent cathode relay for each convertor. This will be arranged to trip the unit H.T. circuit breaker and disconnect the convertor from the D.C. bus bars.

After a discussion in which Mr. WALTER and Mr. DE BOECK took part, the text of *Summary No. 10* was adopted.

Summary No. 11 :

11. *a*) For convertors with a single vacuum enclosure, it is recommended for the protection against the overloads and short circuits to use the H.T. circuit breaker with time delay and instantaneous overcurrent devices;

b) Anode fuses are little used with steel tank rectifiers;

c) Where no anode fuses are installed, a high-speed reverse-current circuit breaker is necessary, if there is a possibility of backfire;

d) Arc-suppression equipment seems to be recommendable, for tensions of 1 to 1,5 kV or more, or if high power units are involved.

After an exchange of views between Messrs. Walter, De Boeck and Pick, *Summary No. 11* was adopted.

Summary No. 12 :

12. In order to protect steel tank rectifiers against excessive heating, *thermostats* are currently used. They either :

a) give a warning signal;

b) actuate or control the cooling system (air or water), or

c) shut down the unit.

These thermostats are necessary wherever no other protective devices against overload exist.

This Summary was adopted.

The following *Summaries Nos. 13 and 14* were adopted without remark.

13. The most rational protective device against a failure in the cooling system controls the circulation of the cooling medium (water or air).

14. The protections against ignition or excitation failure are : the shutting down, at least temporary, of the rectifier unit; however, for attended substations, an alarm system is sufficient.

Summary No. 15 :

15. For convertors with continuous pumping, it is necessary to protect against the loss of vacuum. The action should be the same as for the ignition failure.

M. Walter proposed a modification of the Summary which was *adopted* as follows :

« 15. For converters with continuous pumping, it is necessary to protect against the loss of vacuum. If a protective device against loss of vacuum is installed, the action should be the same as for the ignition failure. »

Summary No. 16 :

16. A surge arrestor is generally installed on each anode.

— Adopted without change.

Summary No. 17 :

17. Automatic voltage control is little or rarely practised because of complexity.

— Adopted without discussion.

Protection of contact lines and of their power supply feeders.

Summary No. 18 :

18. High-speed circuit breakers are used for both A.C. and D.C. systems as a protection against overloads and short circuits.

An exchange of views took place between Messrs. Vrielynck and Walter, the text of the Summary was modified as follows :

« 18. As a protective measure against overloads, high-speed circuit-breakers are generally used on D.C. systems.

« On A.C. traction systems, the tendency is to reduce the duration of short circuits to a minimum by the adoption of circuit breakers which are faster than those used on the transmission lines. »

Summary No. 19 :

19. The protection of contact lines against voltage surges is a matter of local circumstances.

The tendency is to use an electronic surge arrestor or condenser.

— Adopted without change.

Summary No. 20 :

20. The disadvantages of the parallel operation of substations can be taken care of by means of a combination between the characteristics of the circuit breakers in the substations and in the switching stations.

— This Summary was approved without change.

The Meeting then examined the Chapter :

Protection of electric motor vehicles.

Summary No. 21 :

21. On D.C. systems of 1,5 kV and less, ordinary circuit breakers are used for the protection against overloads and short circuits. Fuses are also used.

On D.C. systems of ± 3 KV, high-speed circuit breakers, controlled by overload relays, are used. Differential relays are extensively used.

After an exchange of views between Mr. WALTER, Mr. DE BOECK and Mr. PICK, *Summary No. 21* was modified as follows :

« 21. On D.C. systems of 1.5 kV and less, ordinary circuit breakers can be used for the protection against overloads and short circuits, and fuses can also be used.

« On D.C. systems of ± 3 kV, high-speed circuit breakers, controlled by overload relays, are used. Differential relays are extensively used. »

Summary No. 22 :

22. On D.C. systems the protection against voltage surges, when provided, is in general realised by means of devices with condensers.

This Summary was adopted with a slight modification, as follows :

« 22. On D.C. systems the protection against voltage surges, when provided, is in general realised by means of devices with condensers and sometimes with semi-conducting material. »

Summary No. 23 :

23. On powerful units, and especially for D.C. tensions of the order of 1.5 kV and more, a no-volt tripping is normally provided.

— This Summary was not altered.

Regenerative braking.

Summary No. 24 :

24. The protection should conform to the following essential conditions :

1°) A safe and efficient alternative means of braking must be available under all circumstances. This braking must come into operation *in a very short time,* should the possibility of regenerative braking disappear;

2°) Any over-voltage must be prevented.

This Summary was also adopted without modification.

A discussion arose between Mr.

Vrielynck, Mr. De Busschere *(Chemin de fer du Bas-Congo au Katanga)* and Mr. Walter on several points, among them being regenerative braking and the use of diesel electric locomotives on colonial railways.

The meeting adjourned at 10.45 a.m.

Meeting held on the 25th May, 1954.

M. Vrielynck opened the meeting at 9.15 a.m. and read through the Summaries adopted at the last session.

The *Summaries Nos. 1 to 9* were confirmed.

Chapter :

Protection of static converters.

Summary No. 10 :

At Mr. Pick's request, the first paragraph of *Summary No. 10* was modified as follows :

« 10. For converters with several vacuum enclosures of relatively small capacity, *complete* protection against overloads and short circuits (external and internal) is assured by the combination of :... »

Summary No. 11 :

At the request of Messrs. De Boeck and Pick, paragraph *a*) of *Summary No. 11* was altered as follows :

« 11. *a*) For converters of higher capacity and with a single vacuum enclosure, it is recommended, for the protection against overloads and short circuits, to use the H.T. circuit breaker with time delay and instantaneous overcurrent devices. »

Summaries Nos. 12, 13 and 14 were adopted definitely without remark.

Summary No. 15 :

To give effect to remarks made by Mr. Vrielynck and Mr. Pick, the following text was approved :

« 15. For converters with continuous pumping, some administrations provide a protective device against loss of vacuum.

« In attended substations, however, an alarm system may be sufficient. »

The *Summaries Nos. 16 to 23* were adopted definitely without discussion.

Chapter :

Regenerative braking.

Summary No. 24 :

The text is slightly amended as follows :

« 24. The protection should conform to the following essential conditions :

« *a*) A safe and efficient alternative means of braking must be available under all circumstances. This braking must come into operation *in a very short time*, should the possibility of regenerative braking disappear;

« *b*) Over-voltage must be prevented. »

The agenda being exhausted, Mr. Vrielynck, *President*, thanked the delegates who had taken part in the discussions. He thanked the reporters, Mr. T. S. Pick and Mr. J. De Boeck, especially for the clearness of their reports.

— The meeting closed at 10.0 a.m.

— The complete text of the Summaries adopted is as follows :

SUMMARIES.

Protection of high-tension distribution systems.

« 1. The relay types of current manufacture assure an acceptable protection.

« 2. *(a)* The protection of each point of distribution, including traction substations, is recommended.

« *(b)* In order to obtain an adequate protection of the installations, the protection should include overcurrent relays, combined with earth fault relays; in this respect, relays of the differential type are not sufficient.

Protection of static transformers.

« 3. The ideal protection against overloads and short circuits consists of a group of two devices which control the tripping of the primary circuit breaker:

« *(a)* by an instantaneous overcurrent element;

« *(b)* by a device which includes an element whose temperature would produce *that of the hottest spot of the windings*.

« The protection against overloads of converter units being such as to amply cover that of transformers, it is possible to dispense with protection of transformers themselves.

« 4. Theoretically, it is the « thermal image » which assures the most adequate protection against excessive heating.

« 5. Overcurrent time delay relays assure an acceptable protection for all practical purposes. Thermal relays of this type do not present any marked advantage.

« 6. For oil immersed transformers, the use of contact thermometers measuring the oil temperature or thermostats gives a supplementary protection.

« 7. No H.T. surge arrestor offers a completely reliable protection. Their installation is not indispensable, especially when other devices *ad hoc* exist (earth wires on overhead distribution lines, shock coils on transformer windings).

« 8. There is a general tendency towards the use of the Buchholz relay as a protective device against internal damage to oil immersed transformers.

« 9. It is logical to install a protective device in the air stream of the air cooled transformers.

Protection of static converters.

« 10. For converters with several vacuum enclosures of relatively small capacity, *complete* protection against overloads and short circuits (external and internal) is assured by the combination of :

« *(a)* overcurrent relays actuating the unit H.T. circuit breaker;

« *(b)* high-rupturing capacity anode fuses or high speed overcurrent anode relays;

« *(c)* an individual overcurrent cathode relay for each converter. This will be arranged to trip the unit H.T. circuit breaker and disconnect the converter from the D.C. bus bars.

« 11. *(a)* For converters of higher « capacity and with a single vacuum « enclosure, it is recommended, for the « protection against overloads and short « circuits, to use the H.T. circuit breaker « with time delay and instantaneous « overcurrent devices;

« *(b)* Anode fuses are little used with « steel tank rectifiers;

« *(c)* Where no anode fuses are « installed, a high-speed reverse-current « circuit breaker is necessary, if there is « a possibility of back-fire;

« *(d)* Arc-suppression equipment seems « to be recommendable for tensions of « 1 to 1.5 kV or more, or if high power « units are involved.

« 12. In order to protect steel tank « rectifiers against excessive heating, ther- « mostats are currently used. They « either:

« *(a)* give a warning signal;

« *(b)* actuate or control the cooling « system (air or water), or

« *(c)* shut down the unit.

« These thermostats are necessary where- « ever no other protective devices against « overload exist.

« 13. The most rational protective « device against a failure in the cooling « system controls the circulation of the « cooling medium (water or air).

« 14. The protections against ignition « or excitation failure are: the shutting « down, at least temporary, of the rectifier « unit; however, for attended substations, « an alarm system is sufficient.

« 15. For converters with continuous « pumping, some Administrations provide « a protective device against loss of « vacuum. In attended substations, « however, an alarm system may be « sufficient.

« 16. A surge arrestor is generally « installed on each anode.

« 17. Automatic voltage control is « little or rarely practised because of « complexity.

Protection of contact lines and of their power supply feeders.

« 18. As a protective measure against « overloads, high-speed circuit-breakers « are generally used on D.C. systems. On « A.C. traction systems, the tendency is « to reduce the duration of short circuits « to a minimum by the adoption of « circuit breakers which are faster than « those used on the transmission lines.

« 19. The protection of contact lines « against voltage surges is a matter of « local circumstances.

« The tendency is to use an electronic « surge arrestor or condenser.

« 20. The disadvantages of the parallel « operation of substations can be taken « care of by means of a combination « between the characteristics of the cir- « cuit breakers in the substations and in « the switching stations.

Protection of electric motor vehicles.

« 21. On D.C. systems of 1.5 kV and « less, ordinary circuit breakers can be « used for the protection against over- « loads and short circuits, and fuses can « also be used.

« On D.C. systems of ± 3 kV, high-
« speed circuit breakers, controlled by
« overload relays, are used. Differential
« relays are extensively used.

« 22. On D.C. systems the protection
« against voltage surges, when provided,
« is in general realised by means of
« devices with condensers and sometimes
« with semi-conducting material.

« 23. On powerful units, and especially
« for D.C. tensions of the order of 1.5 kV
« and more, a no-volt tripping is normally
« provided.

Regenerative braking.

« 24. The protection should conform to
« the following essential conditions:

« *(a)* A safe and efficient alternative
« means of braking must be available
« under all circumstances. This braking
« must come into operation *in a very*
« *short time*, should the possibility of
« regenerative braking disappear;

« *(b)* Over-voltage must be prevented.»

— The Plenary Meeting ratified these Summaries during the session of the 26th May, 1954.

Revision of the Rules and Regulations of the International Railway Congress Association.

The Permanent Commission has submitted to the London Session (1954) a proposal tending to revise the Rules and Regulations.

This proposal refers to the *Articles 2 and 6*. The alteration of Art. 2 has for object the easing of the membership formula concerning the National Unions of private railways. With regard to Art. 6, the modification is meant to regularize an already old custom i.e. to nominate « Member of Honour » personalities who have held a mandate of Member of the Permanent Commission for a long period, and to allow when justified by circumstances to elect « Honorary President » the former Presidents of the Association.

The Permanent Commission has proposed the following modifications to *Articles 2 and 6* :

Present wording.	Proposed wording.
Art. 2. — The Association is composed of State Railway Administrations, and of Administrations directly concerned with the working of railways of public utility in countries which have joined the Association.	*Art. 2.* — The Association is composed of State Railway Administrations, and of Administrations directly concerned with the working of railways of public utility in countries which have joined the Association.
It is composed of the Railway Administrations included in the list which has been published in the *Bulletin of the Railway Congress* for September 1922, p. 1274.	It is composed of the Railway Administrations included in the list which has been published in the *Bulletin of the Railway Congress* for September 1922, p. 1274.
The Governments of the countries to which the Association extends may also join the Association.	The Governments of the countries to which the Association extends may also join the Association.
The list of these countries (see appendix) may be altered by a decision of the Permanent Commission, as stated in article 4.	The list of these countries (see appendix) may be altered by a decision of the Permanent Commission, as stated in article 4.
International Organisations which deal essentially with railway operation may be admitted as adherents of the Association, as may also National Unions formed of administrations operating at least 5 000 kilometres (3 107 miles) of railways not belonging to the Association.	International Organisations which deal essentially with railway operation may be admitted as adherents of the Association, *as may also National Unions of railways not belonging to the Association operating a mileage at least equal to 10 per cent of the total railway network of the country.*
Art. 6. — The Permanent Commission shall be composed of ex-Presidents of the sessions of the Congress, ex-officio members, and elected members, the number of which shall be fixed by each Congress.	*Art. 6.* — The Permanent Commission shall be composed of ex-Presidents of the sessions of the Congress, ex-officio members, of elected members, the number of which shall be fixed by each Congress, and of *Members of honour and honorary Presidents.*

Present wording.	Proposed wording.
The elected members shall be, as far as possible, chosen to represent the different Nations. Under no circumstances shall any one Nation have more than nine elected members.	The elected members shall be, as far as possible, chosen to represent the different Nations. Under no circumstances, shall any one Nation have more than nine elected members.
	The members of honour are chosen amongst the elected members of the Permanent Commission, when they have been serving permanently on the Permanent Commission for at least 20 years.
	In exceptional cases, the Congress will have the right to confer the title of Member of honour to former members who, though not fulfilling the above conditions, will have rendered exceptional services to the Association.
One third shall retire at each Congress and shall be eligible for re-election.	One third of the elected members shall retire at each Congress and shall be eligible for re-election.
Members who have ceased to hold office of any kind, so that they are no longer attached to the railway service of an adherent Government, to an adherent Organisation or to a participating Administration, which qualified them at the time of their election, shall cease to be members of the Permanent Commission.	Members who have ceased to hold office of any kind, so that they are no longer attached to the railway service of an adherent Government, to an adherent Organisation or to a participating Administration, which qualified them at the time of their election, shall cease to be members of the Permanent Commission.
It shall be the duty of such a member at once to inform the president when he retires. The Permanent Commission may, upon the application of five members, with the consent of the majority of all its members consulted by letter, ask him to remain until the next Congress.	It shall be the duty of such a member at once to inform the president when he retires. The Permanent Commission may, upon the application of five members, with the consent of the majority of all its members consulted by letter, ask him to remain until the next Congress.
	The past Presidents of the Association may be appointed honorary Presidents.
	The mandates of honorary Presidents and of Members of honour are conferred for life.
The Commission shall always have the power to complete its number by co-opting delegates of the participating Administrations and adherent Governments. In this case, a final election shall be made at the following Congress.	The Commission shall always have the power to complete its number by co-opting delegates of the participating Administrations and adherent Governments. In this case, a final election shall be made at the following Congress.
When the place of meeting of a Congress has been fixed, the Permanent Commission shall have power to co-opt as temporary members, representatives of the country in which the Congress is to be held.	When the place of meeting of a Congress has been fixed, the Permanent Commission shall have power to co-opt as temporary members, representatives of the country in which the Congress is to be held.

These proposals of alteration, in accordance with Art. 20, have been presented to the adherents as prescribed.

In compliance with Art. 21, they have been submitted during the Session to the Special Commission (*) charged to report on these alterations, which must be submitted to the Congress.

With regard to *Art. 2*, the proposal tending to modify the last paragraph was amended by the above special Commission and worded as follows :

« International Organisations which deal essentially with railway operation may be admitted as adherents of the Association, as may also National Unions of railways not belonging to the Association operating either a minimum mileage of 5 000 kilometres, or a mileage at least equal to 10 per cent of the total railway network of the country. »

This wording was approved by the Plenary Meeting during its session of the 25th May 1954.

In addition, the proposal relating to *Art. 6*, accepted without change by the special Commission, was also approved by the Plenary Meeting during the same session, on May 25.

The last formality required, i.e. the written ballot of all the Members of the Association is now in progress.

In compliance with the Rules and Regulations (Art. 22), the results of the ballot (which must be closed six months after the closure of the Congress) will be published in the monthly *Bulletin* of the Association.

(*) See pages 993/4 of this *Bulletin*.

SUMMARY REPORT OF THE DISCUSSIONS AT THE GENERAL MEETINGS

(May 25 and 26, 1954.)

President : General Sir Brian ROBERTSON.

General Secretaries : Messrs. P. GHILAIN and C.E. WHITWORTH.

Meeting held on May 25, 1954.

— The meeting opened at 11 a.m. under the presidency of General Sir Brian ROBERTSON, President of the British Transport Commission, *President of the Session.*

The Assembly examined successively the various items on the agenda :

1. *Ratification of the mandates granted by the Permanent Commission between the two last Sessions.*

Mr. GHILAIN, *General Secretary*, stated that the following mandates, conferred by the Permanent Commission in the interval between the two Sessions (Rome 1950 and London) are submitted for ratification by the Plenary Meeting :

Appointed on the 25th September 1950 :

Messrs. Ch. BOYAUX;
H. VAN GALEN LAST;
G. LINDENBERG (replaced);
F. MAYER (replaced);
Aly Zaki EL ORABY (replaced).

Appointed on the 5th March 1951 :

Messrs. X. REMY;
H. STOKKE;
Dr. M. SCHANTL;
Mohamed EL WAKIL (replaced);
Sir John ELLIOT;
Lt.-Col. WILSON;
Messrs. F. FAZIO;
V. PERRONE;
J. TUJA.

Appointed on the 1st March 1952 :

Dr. GSCHWIND;
Mr. R. KUNZ;
Sir John BENSTEAD;
Messrs. J.M. GARCIA-LOMAS;
R. BENJUMEA Y BURIN (replaced);
M. DIAS TRIGO;
M. CREM;
Hassan Bey FAHMY (replaced).

Appointed on the 9th June 1952 :

Messrs. TARAF ALY (replaced);
F. L. LEHTINEN.

Appointed on the 17th January 1953 :

Messrs. M. De Vos;
A. Pena Boeuf;
Dr.-Ing. Frohne;
Dr. F. Schelp;
M. Jacobshagen;
Dipl.-Ing. A. Brill;
R. Hoens.

Appointed on the 21st November 1953 :

Messrs. W.H.W. Maass;
Hussein Abu Zeid (replaced);
Mohamed Aref Aboul Ata (replaced);
Abdel Moneim Rashad;
A.M. Rizk;
A. Porchez.

Appointed on the 19th May 1954 :

General Sir Brian Robertson;
Mr. K.W.C. Grand;
Commandant Gamal Salem;
Mr. Gamel El Dine Badaoui Hamdy.

— *Approved with loud applause.*

2. *Renewal of mandates expiring at the XVIth Session.*

The *General Secretary* stated that according to the Rules and Regulations, one third of the members of the Permanent Commission shall retire at each Congress and shall be eligible for re-elections. The mandates of the following Members of the Permanent Commission have come to an end :

Mr. J.M. Goursat;
Sir John Benstead;
Messrs. W. Clement;
Dr. R. Cottier;
M. Crem;
Csanadi;
F. Q. den Hollander;
M. Dias Trigo;
Sir John Elliot;
Messrs. F. Fazio;
Dr.-Ing. E. Frohne;
R. Hoens;
Dr. N. Laloni;
G. Olivier;
V. Perrone;
X. Remy;
Hussein Abu Zeid;
J. Tuja;
Wagner;
R.B. White.

All the above-mentioned members have accepted the renewal of their mandate, except Messrs. W. Clement, Wagner and R.B. White for whom negociations are going on.

— *Approved with applause.*

3. *Alterations to the Rules and Regulations (Art. 2 and 6).*

Mr. Ghilain, *General Secretary*, read the proposed modifications (*). He said that the Commission dealing with the examination of the proposal of alteration of the Rules and Regulations was constituted by Mr. De Vos, *President of the*

(*) See pages 989/990 of this *Bulletin*.

Permanent Commission, the four following members of the Permanent Commission : Dr. GSCHWIND *(Swiss Federal Railways)*, Mr. A. PORCHEZ *(French National Railways)*, Mr. E.G.J. UPMARK *(Swedish State Railways)* and Mr. J.M. GARCIA LOMAS *(Spanish National Railways)*; Mr. X. REMY *(Fribourg Railways)* delegated by the authors of the proposal relative to Art. 2; and the five delegates named hereafter for the Sections I to V of the 1954 Congress : Mr. R. LÉVI *(French National Railways. Section I)*, Mr. A. CUTTICA *(Italian State Railways Section II)*, Mr. M. JACOBSHAGEN *(Deutsche Bundesbahn. Section III)*, Mr. O. HOLTMON *(Norwegian State Railways. Section IV)* and Mr. L. RIPERT *(Société Générale des Chemins de fer Economiques, France. Section V)*, and Mr. P. GHILAIN, *Secretary* and delegate of the authors of the proposal concerning Art. 6.

Mr. GHILAIN stated that this Commission has accepted and will submit without modification the proposal already presented to the participants or adherents (Art. 20) relative to the alteration of Art. 6, and which foresees the creation of Honorary Presidents and of Members of Honour.

With regard to Art. 2, the proposal was amended as follows :

« International Organisations which deal essentially with railway operation may be admitted as adherents of the Association, as may also National Unions of railways not belonging to the Association operating either a minimum mileage of 5 000 kilometres, or a mileage at least equal to 10 per cent of the total railway network of the country. »

The altered text of Art. 6, and the new above amendment of the last paragraph of Art. 2 were approved by the Meeting.

4. *Approval of the accounts of the XVth Session.*

Mr. GHILAIN read out the report of the two Auditors responsible for the èxamination and approval of the accounts.

— *These accounts were approved by the Meeting.*

5. *Appointment of Auditors.*

The Meeting approved the appointment of Mr. E.A.W. DICKSON. Treasurer Assistant to Chief Financial Officer, British Railways, and Mr. R. HOULEZ, Chef de la Division de la Comptabilité Générale à la Comptabilité Générale et aux Finances, Société Nationale des Chemins de fer français, as Auditors for the accounts of the XVIth Session.

6. *Examination of the summaries adopted in the different Sections.*

The PRESIDENT proposed to the Meeting the approval of the summaries adopted by the Sections.

Mr. GHILAIN read out the summaries for the following questions :

Questions 1, 3 (Summaries Nos. 1 to 13), 4, 6, 7, 8 and 10.

— *The Assembly ratified these summaries.*

7. *Miscellaneous.*

As no delegate raised any further question, the PRESIDENT thanked the delegates for their attention and declared the meeting closed at 12.25 p.m.

Meeting held on May 26, 1954.

— The Meeting was under the presidency of Sir Brian Robertson, who opened the Session at 3 p.m.

The President requested Mr. Ghilain, *General Secretary*, to report on the first item on the agenda :

1. *Choice of venue for the next Congress.*

Mr. Ghilain, *General Secretary*, stated that as no proposal has been made up to the present regarding the venue of the next Congress, the Assembly was requested to authorise the Permanent Commission itself to determine the venue and the date of the next Session.

— *This proposal was approved.*

2. *Approval of the summaries adopted by the different Sections since the Plenary Meeting of May 25, 1954.*

Mr. Ghilain read out the summaries relating to the following :

Questions 2, 3 (Summaries 14 to 27), 5, 9 and 11.

— *These summaries were approved by the Assembly.*

3. *Miscellaneous.*

The President called upon Mr. Atilio Cappa, *President of the Pan-American Railway Congress Association* (Buenos Aires).

Mr. Cappa, having thanked the Association for having had the kindness to invite him to this Session, recalled that the International Railway Congress Association has often been of great help to the Pan-American Association.

Mr. Cappa then invited the Association to send representatives in 1956 to Buenos Aires, for the IXth Pan-American Congress.

On behalf of the Association, the President thanked Mr. Cappa for this kind invitation.

— As no delegate raised any further matter, the President thanked the delegates for their valuable contribution to, and their attendance at, the meetings.

CLOSURE OF THE SESSION

(26th May, 1954)

The closing ceremony of the XVIth Session was held in the Assembly Hall, CHURCH HOUSE, on Wednesday, May 26, at 4 p.m., under the presidency of Sir Brian ROBERTSON, *President of the Session.*

The President, opening the meeting, delivered the following speech :

« MY LORD, LADIES AND GENTLEMEN,

« Following the approval we have just given to the Summaries adopted in the various sections, we have concluded the work of the Sixteenth Session of the International Railway Congress Association.

« This Congress has been dealing with problems of real significance to the future of railways, and the results of the sectional meetings are not merely the findings reached after discussion but the outcome of close thought by all concerned. You will recall that the Permanent Commission decides on the subjects and selects the reporters, each of whom is expert in his specialised sphere; questionnaires are then sent to all the administrations, and from these the two or three reporters each assembles his report. These, in turn, are summarised in the special reports which form the basis of the discussions in each section. I am sure that the conclusions will prove of great use to each administration and, moreover, that all will benefit from the free exchange of views by the delegates in the sectional and plenary meetings, and more informally elsewhere.

« I will take this opportunity of thanking His Royal Highness The DUKE OF GLOUCESTER, who honoured us by being an Honorary President, and the MINISTER OF TRANSPORT & CIVIL AVIATION, who, in his capacity of Honorary Vice-President, has kept so closely in touch with our work and who, in a few minutes from now, will declare the Session closed. I should also like to acknowledge the assistance I have received from my Vice-President, Sir John BENSTEAD, who has had so much experience of these international railway meetings.

« To-morrow, some of you will be the guests of various manufacturers of railway equipment and allied products. I hope you will see much to interest you and that you will be convinced that Britain, the birthplace of railways, still has much of value to offer on attractive terms to the rest of the world. Others will begin a seven-day tour of Scotland, and I hope they will find enjoyment in the rugged beauty of this northerly sister kingdom.

« It was two years ago that Lord HURCOMB gave an invitation in the name of H. M. GOVERNMENT, the British Transport Commission and their Executives to hold this Congress in London. Speaking for all in British Railways and London Transport, I should like to assure you how gratified we have been

at the wonderful response to this invitation, and what pleasure it has been for all of us to make the arrangements for your reception.

« And now, all that remains is for me to express my best wishes for the continuation of the common activities and friendships established or reinforced at this meeting, and to hope that in the intervening years before the next full Congress, the railways of every country will continue to progress towards a still greater efficiency in the interests of national and international transport and of the good of mankind. » *(Great applause.)*

Mr. De Vos, *President of the Association*, then replied by the speech hercafter :

« Last Wednesday, in this same hall, on the occasion of the solemn inauguration of the Congress under the presidency of His Royal Highness the Duke of Gloucester, many good wishes were given us.

« Today, we have completed our work and in view of the amplitude of the questions which have been discussed and dealt with successfully, and in face of the abundance and scope of the summaries adopted, we can but rejoice at the complete realisation of such wishes and state that the London Congress will hold a noteworthy place in the Annals of our Association.

« If such results have been obtained, it is due to the fruitful collaboration of the British Government and in particular to the Minister of Transport and Civil Aviation, the Right Hon. Alan Lennox-Boyd who has taken a personal interest in all our labours. Our thanks are also due to the British Transport Commission, to the British Railways and to all the members of the Local Organising Committee and its Executive Committee under the chairmanship of Mr. Harrington, to the members of the Permanent Commission, to the Special Reporters and Reporters, to the Presidents of the different Sections, and to their Chief Secretaries and Secretaries.

« I cannot mention the names of all those who have devoted themselves before and during the present Session; I should be afraid of omitting some, there are so many.

« I must however pay a tribute to our dynamic and efficient President, Sir Brian Robertson. It is thanks to his activity and to his competence, as well as to that of Sir John Benstead and the two Secretaries General, Monsieur Ghilain, General Secretary of the Association, and Mr. Whitworth, that the perfect organisation of the Congress is due.

« We also wish to thank all the local authorities who welcomed our delegates and their families during the many successful excursions that have taken place.

« The moment of our departure now draws near, alas, and soon we shall return each to his own country. We will take with us an unforgettable memory of this Congress, of this beautiful country and of the cordial hospitality of our British friends. » *(Long applause.)*

The Minister of Transport and Civil Aviation, The Rt. Hon. Alan Tindal Lennox-Boyd, speaking on behalf of the British Government, before declaring the Session closed, thanked all those who had co-operated in the success of the Congress.

List of Members of the Permanent Commission

OF THE

INTERNATIONAL RAILWAY CONGRESS ASSOCIATION

after the decisions taken at the Plenary Meeting held on the 25th May 1954 (Art. 6 of the Rules and Regulations).

President :

M. **De Vos** (2), directeur général de la Société Nationale des Chemins de fer belges; 19, rue du Beau-Site, Bruxelles.

Vice-presidents :

J.M. **Goursat** (3), directeur de la Région du Nord de la Société Nationale des Chemins de fer français; 18, rue de Dunkerque, Paris (X^{e});

M. **Crem** (3), directeur du Service de l'Exploitation de la Société Nationale des Chemins de fer belges; 17, rue de Louvain, Bruxelles.

Members of the Executive Committee :

E. **Dorges** (2), Secrétaire Général Honoraire aux Travaux Publics et aux Transports, Délégué Général du Ministre pour les Affaires Internationales au Ministère des Travaux Publics et des Transports; 244, boulevard Saint-Germain, Paris;

Sir John **Benstead** (3), Deputy Chairman of the British Transport Commission; 222, Marylebone Road, London, N.W.1;

Sir Gilmour **Jenkins** (1), Permanent Secretary, Ministry of Transport and Civil Aviation (Great Britain); Berkeley Square House, Berkeley Square, London, W. 1.

Ex-presidents of session, members ex-officio :

Ing. G. **di Raimondo**, directeur général des Chemins de fer de l'Etat italien; Rome;

Ibrahim Fahmy **Kerim**; Le Caire;

D^{r} W. **Meile**, ancien président de la Direction générale des Chemins de fer fédéraux suisses; Brügglerweg, 11, Berne.

General Sir Brian **Robertson**, Bart., G.C.B., G.B.E., K.C.M.G., K.C.V.O., D.S.O., M.C., Chairman, British Transport Commission, 222, Marylebone Road, London, N.W.1.

Members :

Armand (2), directeur général de la Société Nationale des Chemins de fer français; 88, rue Saint-Lazare, Paris (IX^{e});

Gamal El Dine **Badaoui Hamdy** (2), sous-secrétaire d'Etat au Ministère des Communications d'Egypte; Le Caire;

F. Ch. **Badhwar** (2), Chairman, Railway Board, Ministry of Railways, Government of India; New Delhi;

Sir John **Benstead** (already named);

Besnard (1), chef de service adjoint au directeur général des Chemins de fer et des Transports, Ministère des Travaux publics et des Transports; 244, boulevard Saint-Germain, Paris;

David **Blee** (2), Chief of Commercial Services, British Transport Commission; 222, Marylebone Road, London, N.W.1;

J. **Bouciqué** (2), directeur du Service de la Voie de la Société Nationale des Chemins de fer belges; 17, rue de Louvain, Bruxelles;

Ch. **Boyaux** (1), directeur général adjoint de la Société Nationale des Chemins de fer français; 88, rue Saint-Lazare, Paris (IX^{e});

Dipl.-Ing. A. **Brill** (2), Ministerialdirektor, Leiter der Maschinentechnischen- und Beschaffungsplanungsabteilung der Hauptverwaltung der Deutschen Bundesbahn; Platz der Republik, 43, Frankfurt (Main);

A. **Brouckaert** (1), Directeur du Service du Matériel et des Achats de la Société Nationale des Chemins de fer belges; 17, rue de Louvain, Bruxelles;

R. **Claudon** (2), inspecteur général des Ponts et Chaussées, vice-président du Conseil d'administration de la Société Nationale des Chemins de fer français; 88, rue Saint-Lazare, Paris (IX^{e});

D^{r} R. **Cottier** (3), directeur de l'Office Central des Transports Internationaux par Chemins de fer; Berne;

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(1) Retires at the 17th session.
(2) Retires at the 18th session.
(3) Retires at the 19th session.

T.C. **Courtney** (2), Chairman of the Coras Iompair Eireann; Kingsbridge Station, Dublin;

M. **Crem** (already named);

Csanadi (3), Directeur général des Chemins de fer de l'Etat hongrois; Budapest;

Dr Ing. A. **Cuttica** (2), chef du Service du Matériel et de la Traction des Chemins de fer de l'Etat italien; Florence;

Dargeou (2), directeur du Service central du Mouvement de la Société Nationale des Chemins de fer français; 8, rue de Londres, Paris, (IXe);

J. **de Aguinaga** (1), Director General de Ferrocarriles, Tranvias y Transportes por carretera; Madrid;

F.Q. **den Hollander** (3), président des Chemins de fer néerlandais, S.A.; Utrecht;

Ing. V. **Desic** (1), professeur à la Faculté Technique de Belgrade, Conseiller permanent du Ministère des Chemins de fer de la République fédérative populaire yougoslave; Belgrade;

M. **De Vos** (already named):

M. **Dias Trigo** (3), directeur des Services d'Exploitation et du Matériel de la Direction des Transports terrestres au Ministère des Travaux publics et des Communications du Portugal; Lisbonne;

Ing. G. **di Raimondo** (already named);

E. **Dorges** (already named);

J. **Elliot** (3), Member of the British Transport Commission, Chairman of the London Transport Executive; 55, Broadway, Westminster, London, S.W.1;

W.T. **Faricy** (2), president, Association of American Railroads; Transportation Building, Washington, 6. D.C.;

Dr Ing. F. **Fazio** (3), conseiller d'administration aux Chemins de fer de l'Etat italien; Rome;

Prof. Dr.-Ing. E. **Frohne** (3), Erster Präsident der Deutschen Bundesbahn; Platz der Republik, 43, Frankfurt (Main);

J.M. **Garcia-Lomas** (1), directeur du Réseau National des Chemins de fer espagnols; Madrid;

J.M. **Goursat** (already named);

K.W.C. **Grand** (1), Chief Regional Manager, Western Region, British Railways; 222, Marylebone Road, London, N.W.1;

Dr **Gschwind** (1), président de la Direction générale des Chemins de fer fédéraux suisses; Berne;

R. **Hoens** (3), directeur général de la Société Nationale belge des Chemins de fer vicinaux; 14, rue de la Science, Bruxelles;

Dr **Huyberechts** (1), directeur général adjoint de la Société Nationale des Chemins de fer belges; 17, rue de Louvain, Bruxelles;

M. **Jacobshagen** (1), Ministerialdirektor, Leiter der Betriebsabteilung der Hauptverwaltung der Deutschen Bundesbahn; Platz der Republik, 43, Frankfurt (Main);

Sir Gilmour **Jenkins** (already named);

Ing. Ch. **Kalitzov** (1), chef de la Section du mouvement des Chemins de fer et des Ports de l'Etat bulgare; Sofia;

Ibrahim Fahmy **Kerim** (already named);

A. **Kriz** (2), ingénieur, conseiller supérieur de Section au Ministère des Communications de la République tchécoslovaque; Prague;

R. **Kunz** (1), directeur de l'Office fédéral des transports; Berne;

Dr N. **Laloni** (3), directeur général adjoint des Chemins de fer de l'Etat italien; Rome;

Dr Ing. G. **Lasz** (2), conseiller d'administration aux Chemins de fer de l'Etat italien; Rome;

F.L. **Lehtinen** (2), Directeur général des Chemins de fer de l'Etat de Finlande; Helsinki;

R. **Lévi** (1), directeur des Installations fixes de la Société Nationale des Chemins de fer français; 42, rue de Châteaudun, Paris;

W.H. **Maass** (2), advisory engineer to the High Commissioner for the Union of South Africa; South Africa House, Trafalgar Square, London, W.C.2.;

M. **Malderez** (1), secrétaire général du Ministère des Communications de Belgique; 17*a*, rue de la Loi, Bruxelles;

Ing. F. **Marin** (2), vice-directeur général des Chemins de fer de l'Etat italien; Rome;

Dr W. **Meile** (already named);

P. **Nolet de Brauwere** (2), Secrétaire Général de la Société Nationale des Chemins de fer belges; 17, rue de Louvain, Bruxelles;

J.H. **Nuelle** (2), president, Delaware & Hudson Railroad Corporation; 32, Nassau Street, New York City;

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(1) Retires at the 17th session.
(2) Retires at the 18th session.
(3) Retires at the 19th session.

G. **Olivier** (3), directeur général adjoint de la Société Nationale des Chemins de fer belges; 17, rue de Louvain, Bruxelles;

A. **Peña Bœuf** (2), Président du Conseil d'Administration du Réseau National des Chemins de fer espagnols; Madrid;

Dr Ing. V. **Perrone** (3), inspecteur général supérieur de la Motorisation Civile et des Transports concédés; Rome;

A. **Porchez** (1), directeur général adjoint de la Société Nationale des Chemins de fer français; 88, rue Saint-Lazare, Paris (IXe);

Abdel Moneim **Rashad** (2), directeur général adjoint des Chemins de fer de l'Etat égyptien; Le Caire;

X. **Remy** (3), directeur des Chemins de fer Fribourgeois et président de l'Union d'Entreprises suisses de Transport; 3, avenue de Pérolles, Fribourg;

A.M. **Rizk** (2), directeur général des Chemins de fer de l'Etat égyptien; Le Caire;

General Sir Brian **Robertson** (already named);

Commandant Gamal **Salem** (3), Ministre des Communications d'Egypte; Le Caire;

Dr M. **Schantl** (2), Secrétaire général des Chemins de fer fédéraux autrichiens; 9, Elisabethstrasse, Vienne I;

Dr. F. **Schelp** (2), Präsident der Deutschen Bundesbahn; Platz der Republik, 43, Frankfurt (Main);

H.E. **Stokke** (1), directeur général des Chemins de fer de l'Etat norvégien; Oslo;

E.D. **Terkelsen** (2), directeur général des Chemins de fer de l'Etat danois; 40, Sölvgade, Copenhague, K;

J.C.L. **Train** (1), member of the British Transport Commission; 222, Marylebone Road, London, N.W.1;

Tuja (3), secrétaire général de l'Union internationale des Chemins de fer; 10, rue de Prony, Paris;

E.G.J. **Upmark** (1), directeur général des Chemins de fer de l'Etat suédois; Stockholm;

F. Perez **Villamil** (1), directeur adjoint du Réseau National des Chemins de fer espagnols; Madrid;

Lt.-Col. G.R.S. **Wilson** (1), chief inspecting officer of Railways, Ministry of Transport and Civil Aviation; Berkeley Square House, Berkeley Square, London, W.1;

N... (1) Argentine.
N... (2) Argentine.
N... (1) China.
N... (2) Great Britain.
N... (3) Great Britain.
N... (2) Netherlands.
N... (3) New-Zealand.
N... (3) Poland.
N... (1) Rumania.
N... (1) Switzerland.
N... (3) U. S. A.
N... (3) U. S. A.

Honorary President :

F.H. **Delory,** directeur général honoraire de la Société Nationale des Chemins de fer belges; 2, avenue Rév. Clément, Rixensart.

Members of Honour :

O.V.S. **Bulleid,** Chief Mechanical Engineer, Coras Iompair Eireann; Inchicore Works, Dublin.

R. **da Costa Couvreur,** ancien président du Conseil supérieur des Travaux publics au Ministère des Travaux publics et des Communications du Portugal; Alameda das Linhas de Torres, 149, Lisbonne;

P. Ghilain, Directeur honoraire du Service du Matériel et des Achats de la Société Nationale des Chemins de fer belges, Secrétaire général de l'Association; 19, rue du Beau, Site, Bruxelles.

Ranald J. **Harvey,** consulting engineer, 34, Victoria Street, Westminster, London, S.W.1.

The Rt. Hon. Lord **Hurcomb,** G.C.B., K.B.E. Chairman, British Transport Commission 1947-53; 47, Campden Hill Court, Campden Hill Road, Kensington, London W. 8;

U. **Lamalle,** directeur général honoraire de la Société Nationale des Chemins de fer belges, professeur de cours de chemins de fer à l'Université de Louvain; 27, rue de l'Aurore, Bruxelles.

(1) Retires at the 17th session.
(2) Retires at the 18th session.
(3) Retires at the 19th session.

SECRETARY'S OFFICE : **19, rue du Beau Site, Brussels.**

General Secretary : **P. Ghilain.**

VISITS, EXCURSIONS AND FUNCTIONS

TECHNICAL VISITS.

During the course of the Congress, a number of visits were organised to enable delegates to see something of the methods of working and technical developments on British Railways and London Transport. Each of the visits lasted two to three hours and trains were provided to transport the groups of delegates to the more distant points. Senior officers and technical staff, with interpreters, accompanied the delegates on each visit, and descriptive pamphlets in English and French were issued. On some of the visits, sightseeing excursions for ladies accompanying the delegates were offered as an alternative.

The following are brief descriptions of the visits made :—

May 19th.

Willesden Carriage Cleaning and Servicing Depot, London Midland Region, British Railways.

Delegates inspected this depot which was brought into service in 1953 and embodies the most modern methods of cleaning and servicing trains. It is the only depot in the country where both the application of cleaning solution and the outside washing of coaches are done by machines. The shed, in which inside cleaning and all maintenance work is performed, is fully equipped with hot and cold water, gas, vacuum and electric points and is worked on a progressive system, coaches being mechanically hauled through it in stages. The work previously dealt with at various sites is now concentrated more economically at the one depot. A laundry, built over the shed, deals with sleeping car linen.

Electrical Centrol Rooms and Sub-Stations, Southern Region, British Railways.

On the Southern Region, a large part of the 660 volt D.C. traction power has hitherto been supplied from sub-stations operating at 11 000 volts, 25 cycles. As the old equipment is now due for renewal, the opportunity is being taken to obtain all supplies from the British Electricity Authority's grid system at the standard frequency of 50 cycles. The conversion scheme involves the provision or alteration of 72 sub-stations, which will be supplied through a 33 000 volt oil-filled cable system owned by the railway. The sub-stations will be equipped with steel or glass pumpless mercury arc rectifiers. Wimbledon, where delegates inspected the installations, is a typical example of one of the larger glass rectifier sub-stations. The sub-stations will be remotely controlled from three Control Rooms, of which Raynes Park, also visited by delegates, is a typical example.

May 20th.

Swindon Works, Western Region, British Railways.

Delegates toured the principal Locomotive Erecting and Machine shops and saw locomotives receiving partial or complete overhaul and examples of the machining operations on engine details. They also saw a « Castle » class locomotive undergoing trials on the Engine Test Plant and had the opportunity of examining test results and their application to practical railway problems. They inspected the Tool Room, a well equipped shop, which manufactures practically all the tools used on the Western Region of British Railways, including taps and dies of all types, also jigs and gauges, etc., and finally visited the Carriage & Wagon Shops where, among other things, they witnessed the fabrication of all-steel coaches.

London Transport Civil Engineering Depot, Lillie Bridge.

Delegates visited the London Transport Permanent Way Depot and the Signal Overhaul Shop at Lillie Bridge. They saw the General Engineering Shop, the Point and Crossing Shop and the Layout Ground, where point and crossing layouts are assembled. They also saw the Flash Butt

Welder used to weld rails into 300 ft lengths, and the post-heater used to relieve stresses set up by welding.

In the Signalling Shop, delegates watched the overhaul of signal relays on the progressive working system and saw some of the overhaul work carried out in the shop on various kinds of electrical and telephonic apparatus.

May 21st.

Southampton Docks,
British Transport Commission.

A visit was made to the Ocean Terminal at Southampton, a modern passenger and cargo reception station, which is generally acknowledged to be one of the best of its kind in the world. Its two-story construction enables passengers to be dealt with on the upper floor, where there are two tastefully decorated Reception Halls, each with its adjacent Customs Examination Hall, with every amenity for the embarking or disembarking passenger. The ground floor is used as a working floor for cargo, ships' stores, baggage, motor cars and reception and despatch of boat trains.

A cruise in Southampton Water and round the Docks in the British Railways m.v. Shanklin enabled the delegates to view the deep-water approaches to the Docks and something of the Harbour, including the Esso Oil Refinery at Fawley.

Liverpool Street-Shenfield Electrification,
Eastern Region, British Railways,
and
Central Line Tube Extension,
London Transport.

The installations visited on the Eastern Region were the Electric Train Depot at Ilford and the sub-station and Electrical Control Room at Chadwell Heath. At Ilford, the general depot layout and facilities provided for the inspection, maintenance, repair and cleaning of electric rolling stock were examined, particular attention being given to the special equipment for the various phases of work carried out in the Repair Shop. A feature of the Shenfield electrification is that the six traction sub-stations and four track sectioning cabins covering the electrified lines are unattended, being controlled and operated, as required, from the Control Room at Chadwell Heath, and the system by which this is done was demonstrated.

From Chadwell Heath delegates went in London Transport coaches to Newbury Park Station (Central Line, London Transport) to take tea there in the modern staff canteen. They also observed the striking concrete awning to the bus stand used by passengers interchanging between road and rail. Delegates then continued by coach to Gants Hill Station and examined the access subways and circulating areas there and at Redbridge Station. They returned by Central Line service train.

May 24th.

British Railways Locomotive Testing Station,
Rugby, London Midland Region.

The Testing Station was opened in 1948 and is equipped with seven Froude-type hydraulic brakes and Amsler recording gear. The buildings consist of the Test Plant and Steaming shed and an administrative block.

On arrival, delegates were given a description of the Testing Station and the method of testing employed. A Class 9, 2-10-0 freight locomotive was then moved into position on the test plant and coupled up, after which a demonstration test was started.

The visitors were able to see the method of conducting a test and were able to inspect the plant, including the Control Room.

Railway protection works against sea erosion,
Folkestone Warren, Southern Region,
British Railways.

The main line between Folkestone and Dover passes through an area of unstable land approximately 2 miles long, below chalk cliffs some 400 feet high, based on a bed of gault. From time to time, erosion has reduced the stability of this area to such an extent that major land slips have occurred. To prevent a recurrence and to ensure the safety of the line, major works, which were inspected by the delegates, have been undertaken in recent years and are continuing at the present time. These consist of a new sea wall constructed of precast concrete blocks to prevent erosion, and mass weighting of the shore.

Official dinner given by the British Transport Commission.
General view.

London Transport Railway Rolling Stock Overhaul Works, Acton.

Delegates visited the London Transport Acton Works, where all railway rolling stock and escalators in use on the system are maintained. They saw the mechanical cleaning of upholstery in the Trimming Shop and the removal of the car bodies from the service bogies in the Lifting Shop. They then followed the routes taken by both bogies and car bodies through the various shops. Amongst other items of plant, they saw the ultrasonic flaw detector in the wheel area, which gives visual warning of hidden fractures in arches, the special lathes used for wheel turning and the valve-testing panel in the car body shop.

May 25th.

British Railways/London Transport Exhibition of Locomotives, Rolling Stock, Civil Engineering and Signalling Equipment, Willesden Motive Power Depot.

This exhibition was staged in and around the locomotive shed at Willesden and included various items of the latest locomotives, rolling stock and Civil and Signalling Engineering equipment used on British Railways and London Transport.

Amongst the exhibits were a new Class 8, 4-6-2 locomotive and the various types of diesel locomotives introduced during recent years. A gas turbine and an electric Co + Co locomotive were also on view.

One of the latest Cafeteria Cars and a lightweight diesel rail car, which was introduced on a new passenger service in the Leeds district at the beginning of June, were also exhibited.

The Signalling and Civil Engineering equipment comprised up-to-date machinery and vehicles used in connection with the maintenance and repair of the permanent way and railway buildings.

May 26th.

British Railways Exhibition « Collection and Delivery - Past and Present », Marylebone Station.

This exhibition illustrated the development of railway operated collection and delivery in Great Britain through 80 years and the scope and equipment of present-day service.

There were included many historical photographs, drawings and documents, some of which showed the pioneer work of the former railway companies. There was a diagrammatic picture of modern zonal collection and delivery and a graphic summation of the whole cartage service.

Several historical horse-drawn vehicles and the mechanical horse of 1930 were paraded, manned by drivers wearing the old Company uniforms, but the major part of the exhibition was an array of modern vehicles, representative of the wide range of equipment now used by British Railways for the various kinds of collection and delivery service.

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EXCURSIONS.

In addition to the technical visits described above, half-day excursions, particularly for the ladies accompanying delegates, were also arranged to Hampton Court and Windsor by motor-coach, and to Brighton, Eastbourne and Cambridge by train. Sightseeing tours of the City and of the West End of London by motor-coach were also provided.

During the week-end of May 22nd/23rd, four excursions were offered by British Railways. Two of these were to Scotland, with different itineraries, but both including the city of Edinburgh and the Clyde Estuary. Another was to the West Country, embracing Dartmoor, Torquay and the River Dart. The fourth excursion was to the Southern Countries and included Salisbury, Stonehenge, Bournemouth, New Forest and Dorchester.

*
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FUNCTIONS.

Reception of Delegates by the British Government.

On the evening of Wednesday, May 19th, delegates and their ladies were invited to a reception in their honour given by Her Majesty's Government at the Tate Gallery. This reception was also attended by many other guests representative of public life of Great Britain. The guests were received

by the Right Hon. Alan T. Lennox-Boyd, Minister of Transport and Civil Aviation, and Lady Patricia Lennox-Boyd, who were accompanied by Sir Gilmour and Lady Jenkins.

Light music was provided by the Band of Her Majesty's Grenadier Guards.

Official Congress Dinner.

On Tuesday, May 25th, delegates and their ladies were invited to an official dinner given by the British Transport Commission, at Grosvenor House, Park Lane. The dinner was presided over by Sir Brian Robertson and, among the Company, were His Excellency the Belgian Ambassador, the Marquis du Parc Locmaria, the Right Hon. Alan T. Lennox-Boyd, the Minister of Transport and Civil Aviation, and many others representative of public life in Great Britain.

During the course of the dinner, the light orchestra of the Corps of Royal Engineers played a programme of light music. The toast of the International Railway Congress Association was proposed by the Minister of Transport and Civil Aviation to which Mr. De Vos, President of the Association, replied. Sir Brian Robertson proposed the toast of the Guests to which the response was made by Mr. Goursat, Vice-President of the Association.

Afterwards there was dancing to the music of Sydney Lipton's orchestra.

Performance of Ballet.

On the evening of Wednesday, May 26th, the final day of the Congress, delegates and their ladies attended a performance of « The Sleeping Beauty » given by the Sadler's Wells Ballet at the Royal Opera House, Covent Garden. The performance of the company and, in particular, the exquisite dancing of the world-famous Miss Margot Fonteyn and Mr. Michael Somes, who headed the cast, coupled with the delightful interpretation of Tchaikovsky's music by the Covent Garden Orchestra, was received with enthusiastic appreciation by the audience. The evening's entertainment was a happy and well-chosen conclusion to a memorable Congress.

*
* *

POST CONGRESS TOURS.

At the end of the Congress, those delegates who wished to prolong their visit to the United Kingdom were able to join one or other of two different excursions to Scotland arranged by British Railways in conjunction with Thomas Cook & Son Ltd.

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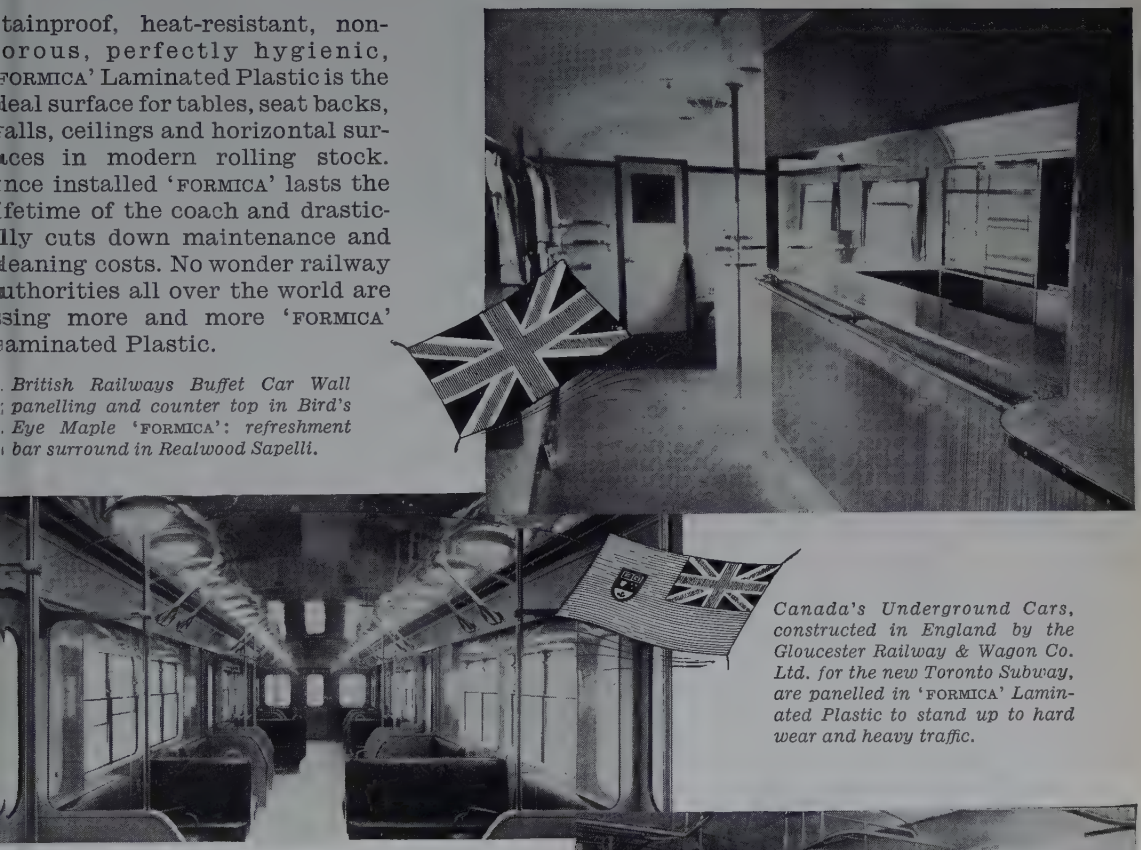

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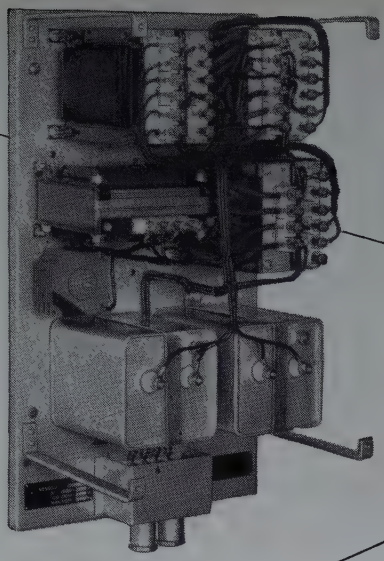

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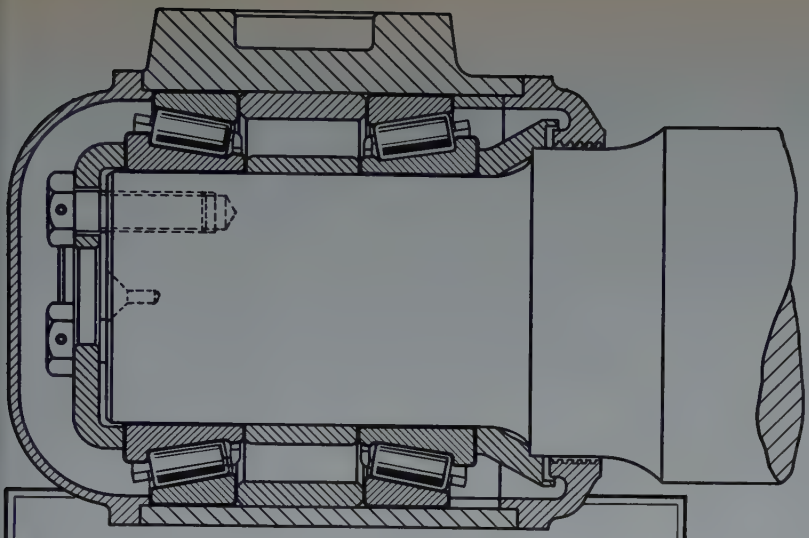

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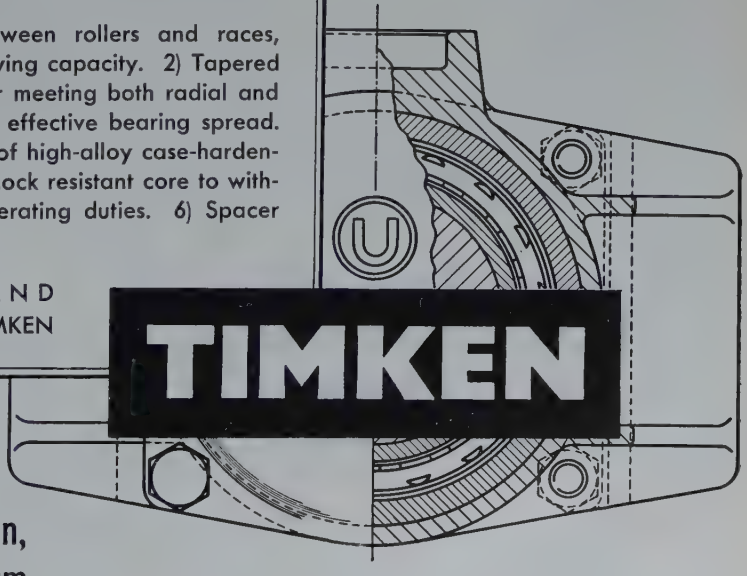

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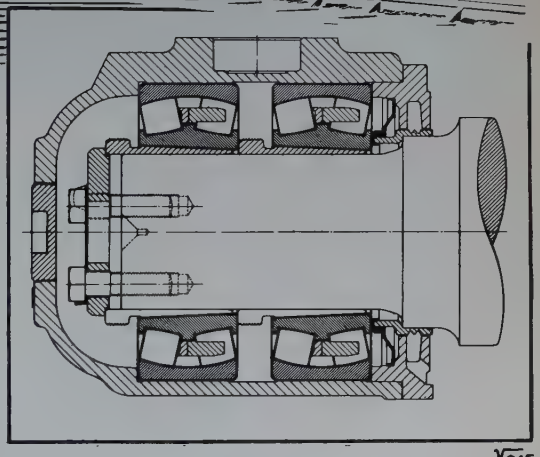

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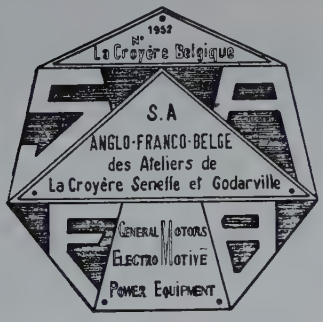

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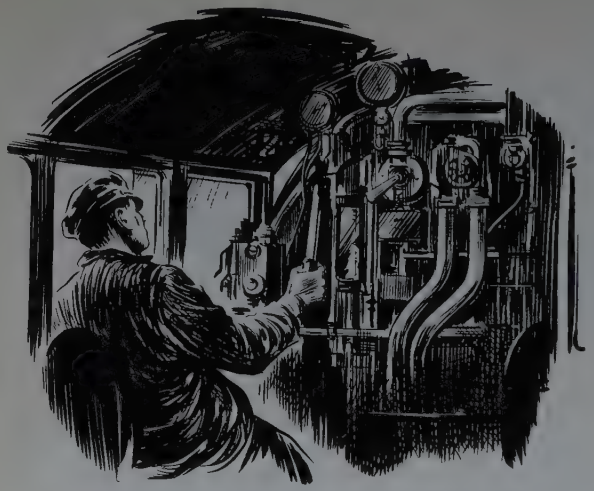

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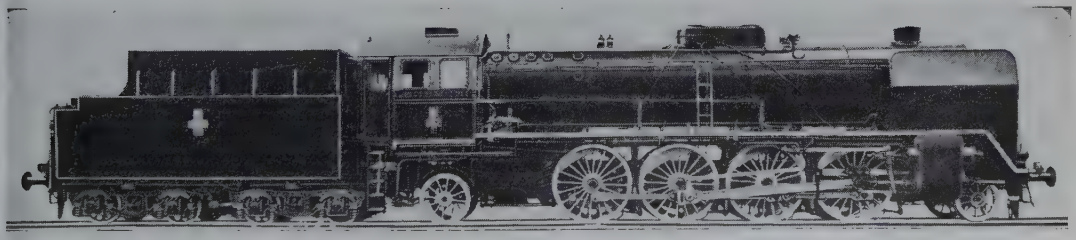

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